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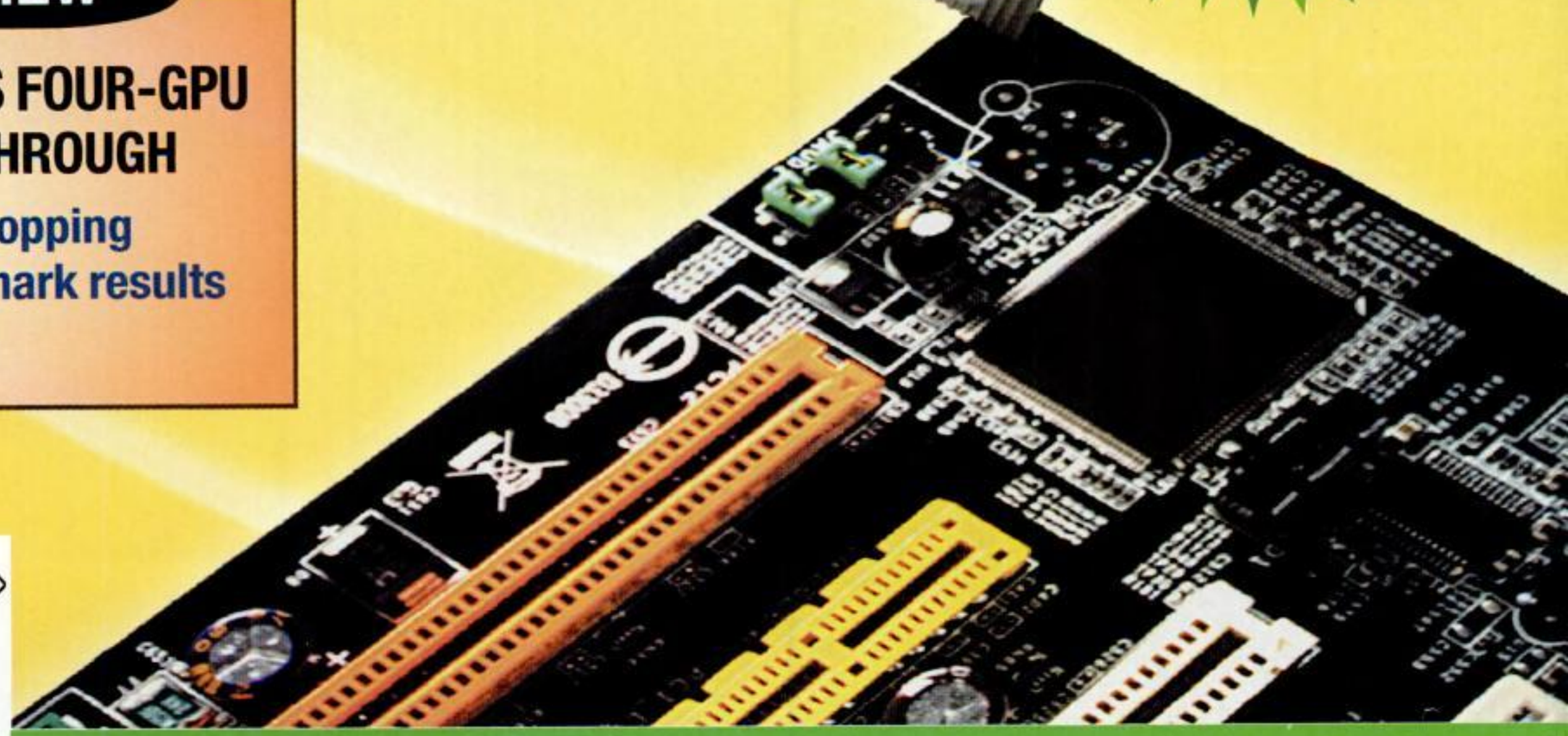

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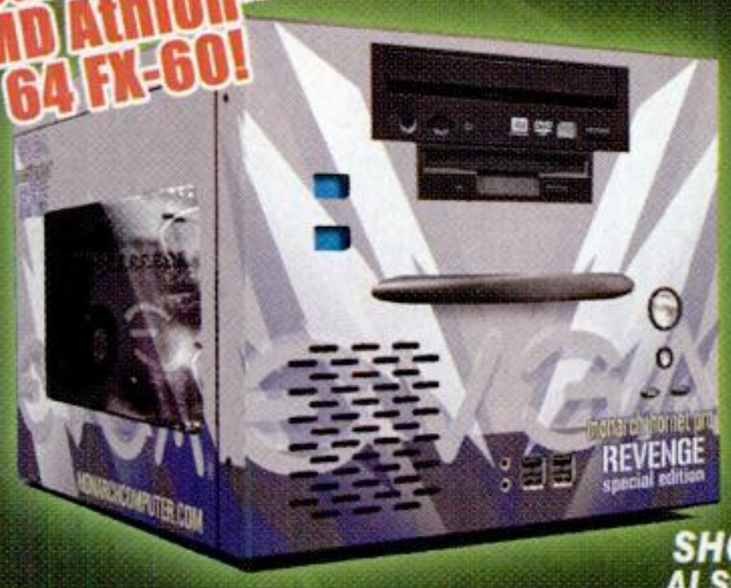

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Ed Word

PC Gaming Dead? I Think Not

Please send feedback and peanut butter cookies to ***will@maximumpc.com.***

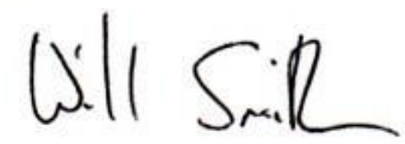
In his column this month, Tom McDonald proclaims the death of the PC gaming. While I usually agree with Tom, I've got to call bunk this time. I'm sick of hearing pundits announce the death of PC gaming. As a gaming platform, the PC is just as relevant today as it was in 1993, the first time I fired up *Quake*.

I admit, I played *Halo 2* deathmatch on the Xbox—I played it lots. Why? It's simple: *Halo 2's* kick-ass matchmaking let me meet up with my buddies, then jump into matches with them against other people. On the PC, it's difficult to game with friends online, especially in shooters, such as *Battlefield 2*.

Although the PC doesn't offer as sublime a matchmaking experience as Xbox Live, matchmaking is one of the *only* areas where the PC platform shows weakness. Let's look at controls. Gamepads do not good FPS controllers make. You can't turn fast enough, and the gamepad isn't precise enough to reliably hit anything, especially if you're sniping or going for headshots. I spent a lot of time playing *Halo*, but there wasn't a moment in which I didn't pine for my mouse and keyboard. I'm not even going to talk about the poor controls on console strategy games. Sure, sports games and platformers play better with a gamepad, but I already own a pad for my PC.

The only other conceivable knock against the PC is pricing. PC naysayers like to point to $8,000 über high-end gaming rigs, but let's be realistic—they are not the norm. You can build a badass gaming rig for $1,500. And just a few hundred bucks spent on memory and a midrange videocard can give even the lowliest PC a huge performance boost. To put that in perspective, I spent close to $600 on my Xbox 360 (including extra gamepads and a Wi-Fi adapter), and it's looking like the PlayStation 3 is going to cost the better part of a grand. Your not-just-good-for-gaming PC suddenly doesn't seem that expensive, does it?

The thing that really pisses me off is the sad tale of the "decline in PC game sales." There's a fundamental problem with the data almost all those doomsayers refer to: The overquoted sales numbers from market research firm NPD don't include any kind of information on online sales. That means nothing you buy online, whether through Amazon or Steam, counts as a sale. Nor do MMO subscriptions! I guess the NPD thinks the 5 million people who pay $15 a month to play *World of Warcraft* don't matter.



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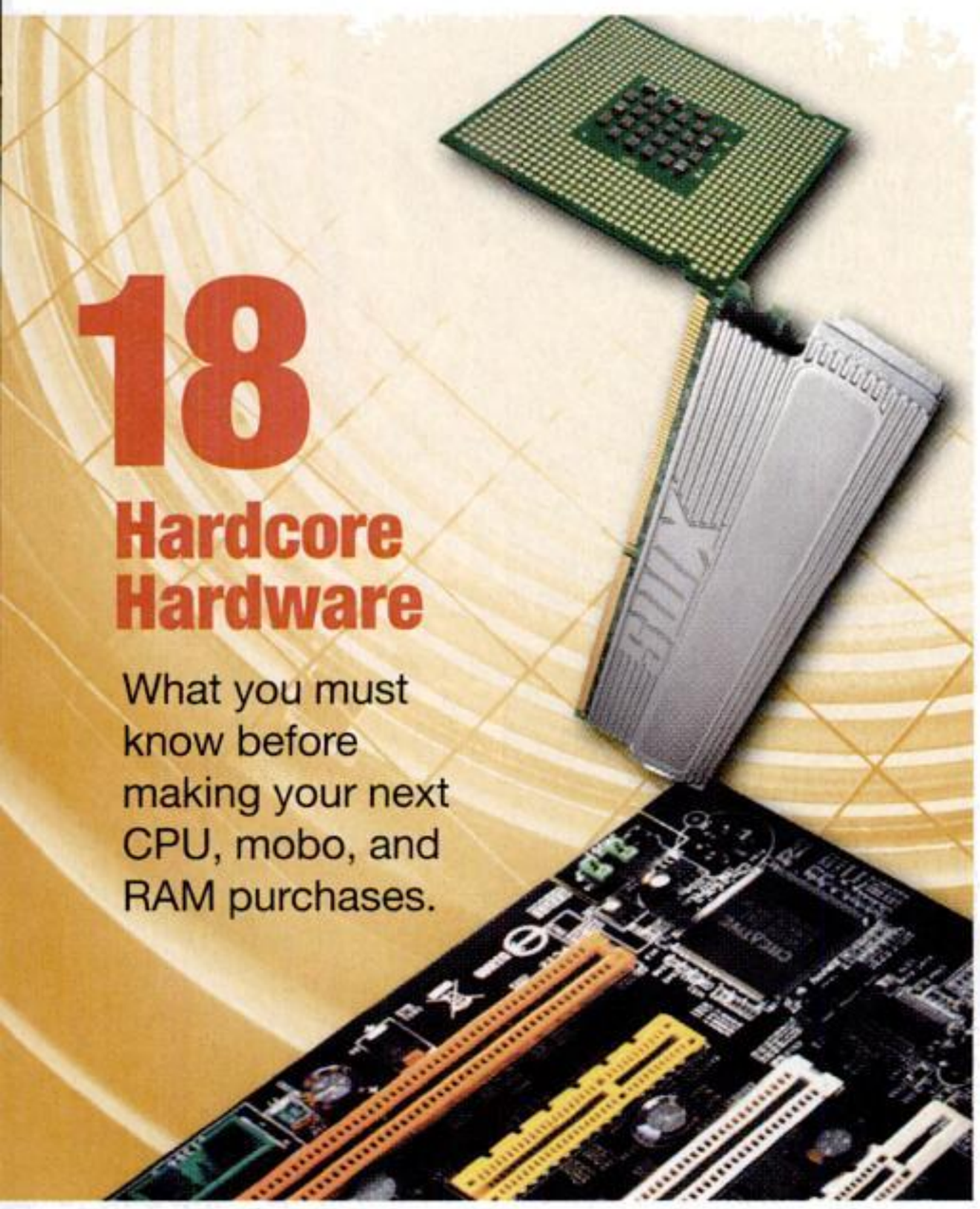

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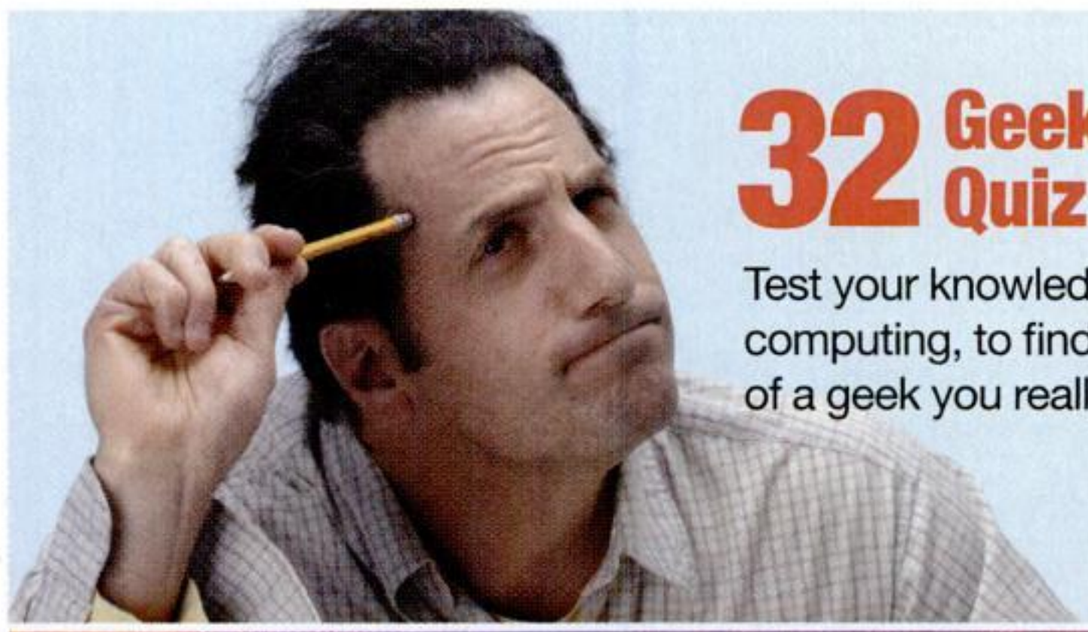
What you must know before making your next CPU, mobo, and RAM purchases.



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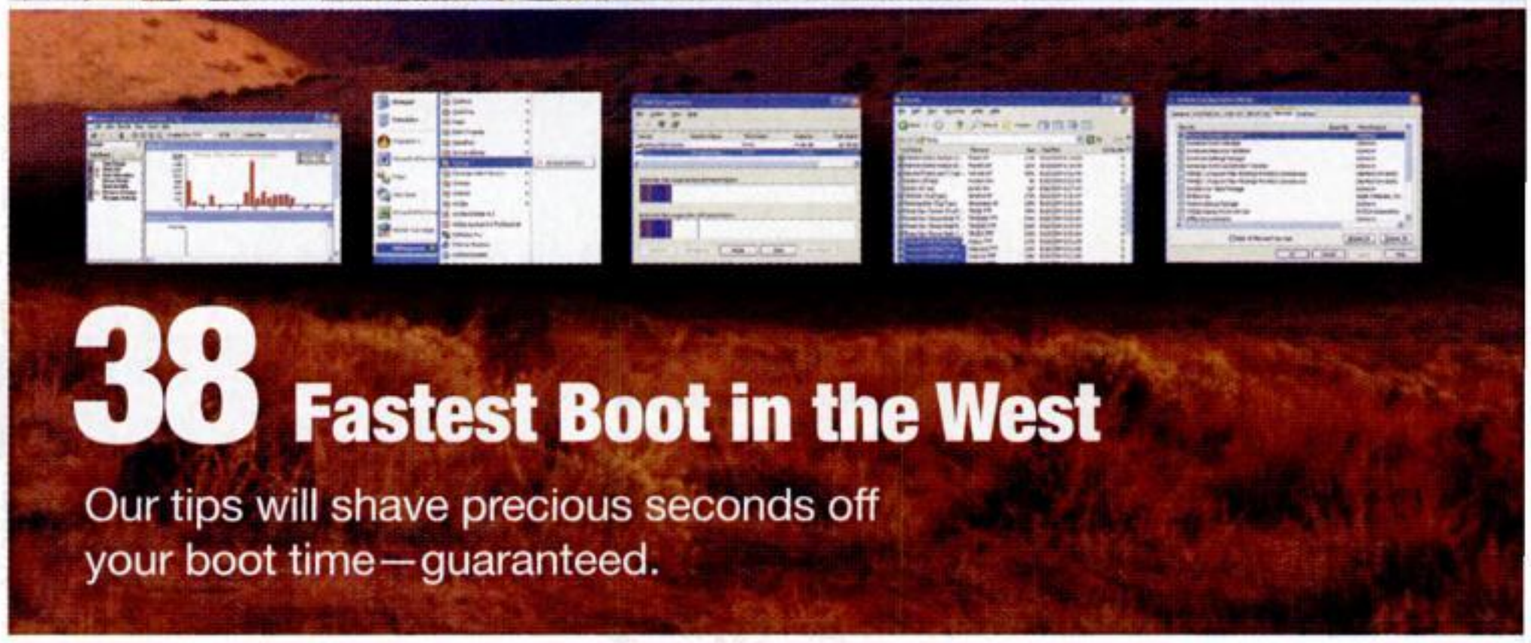

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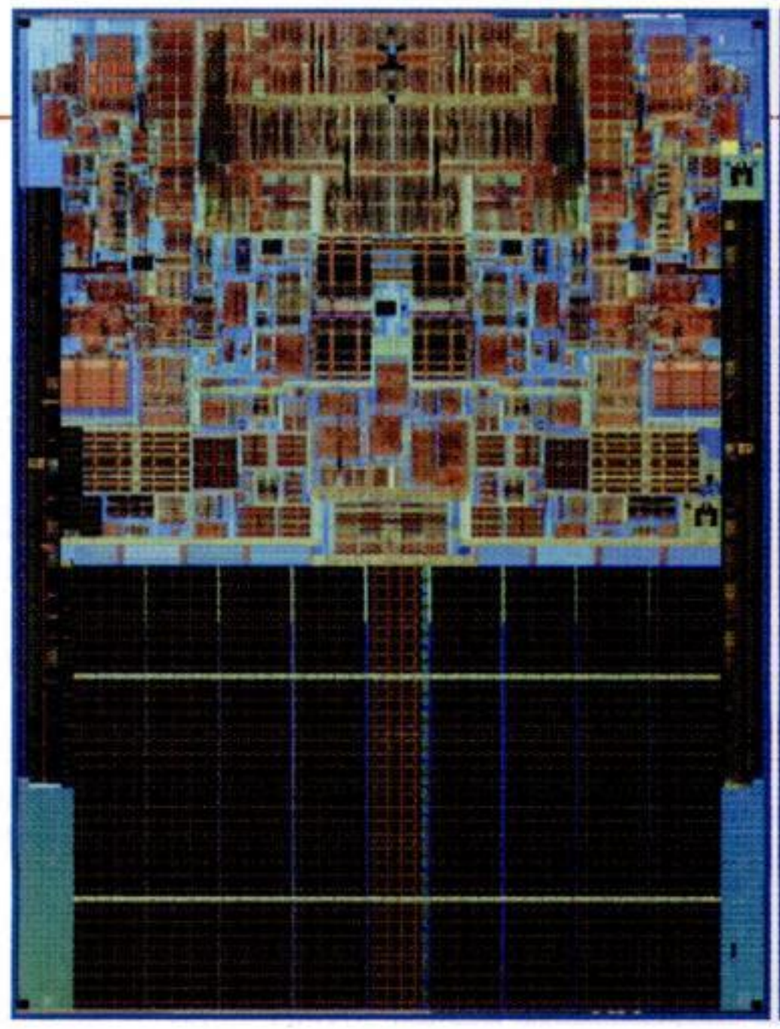
Intel Unveils Its Next-Gen CPU Microarchitecture

At its spring developer conference, Intel pulled the wraps off the upcoming Conroe CPU, dished on quad-core plans, and stuck to its front-side-bus guns



Intel's 65nm Conroe processor is a single die with two cores, whereas today's 65nm Presler CPU has two separate dies, each with its own core.

Has the slumbering giant finally awoken? That's the question many were asking after an unusually in-your-face performance from the semiconductor giant at the Intel Developer Forum.

The company ditched its usual boy-in-a-bubble act to call out AMD—WWE-style. The company stopped just short of chucking folding chairs into the audience, but it did say that the upcoming Conroe processor will not only outperform today's Athlon 64 FX-60, it'll even kick an overclocked Athlon 64 FX-60 squarely in the family jewels.

The dual-core Conroe uses the new Core microarchitecture, which replaces the Pentium 4's aging NetBurst technology. The Core architecture is the spiritual opposite of NetBurst. Instead of running at ultra-high frequencies, it's designed to be more effective when running at lower clock speeds. Where the Pentium D and P4 take two clock cycles to complete an SSE instruction, Conroe can complete those instructions in a single clock cycle. In addition to that, a technology Intel calls Macro Fusion can combine two instructions into one, for even faster processing.

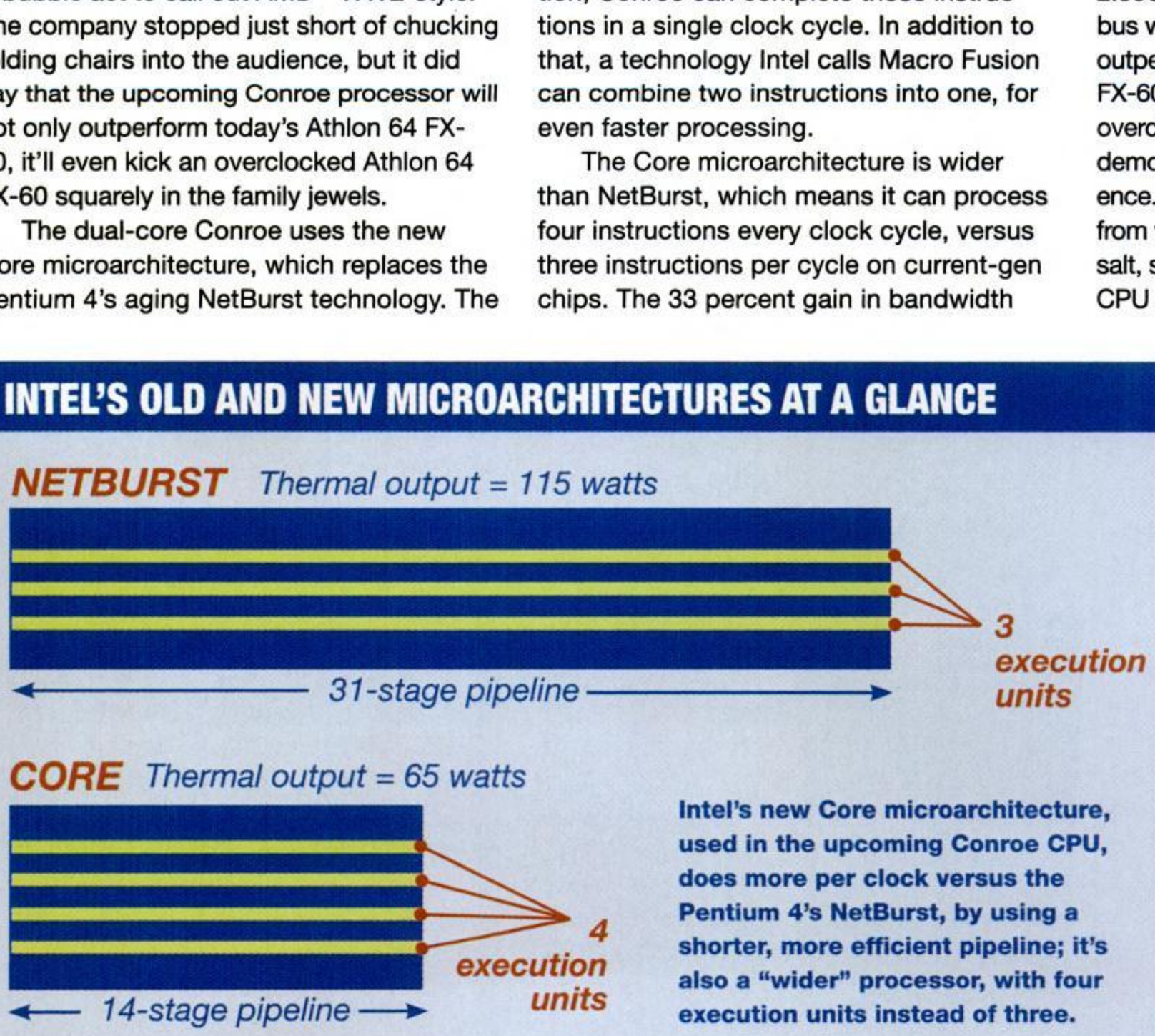
The Core microarchitecture is wider than NetBurst, which means it can process four instructions every clock cycle, versus three instructions per cycle on current-gen chips. The 33 percent gain in bandwidth will actually net a peak 66 percent gain when the CPU combines instructions with Macro Fusion.

All this, Intel claims, amounts to a CPU that could shift the balance of power back to Santa Clara. In fact, Intel claims that a 2.66GHz Conroe on a 1,066MHz front-side bus with 4MB of smart cache will not only outperform a dual-core 2.6GHz Athlon 64 FX-60, it will easily outperform that FX-60 overclocked to 2.8GHz. In fact, the company demonstrated the latter point at the conference. We always take benchmark numbers from vendor-built systems with a huge grain of salt, so we plan to test it ourselves when the CPU ships this summer.

Intel also talked up the sequel to Conroe: the quad-core CPU codenamed Kentfield that is essentially a pair of dual-core Conroe dies inside a single CPU package. The quad-core Kentfield is expected to makes its debut in 2007.

Ever since Intel released its first dual-core CPU, its design—which has both cores sharing the front-side bus bandwidth—has been criticized. But it appears Intel is sticking to its guns for future CPUs. Intel says its bandwidth tests prove the design offers plenty of headroom for today and the near term. According to Intel, the front-side-bus bandwidth exceeds current maximum memory bandwidth, so the FSB gap that AMD has so skillfully played up isn't really a problem.

INTEL'S OLD AND NEW MICROARCHITECTURES AT A GLANCE



Intel's new Core microarchitecture, used in the upcoming Conroe CPU, does more per clock versus the Pentium 4's NetBurst, by using a shorter, more efficient pipeline; it's also a "wider" processor, with four execution units instead of three.

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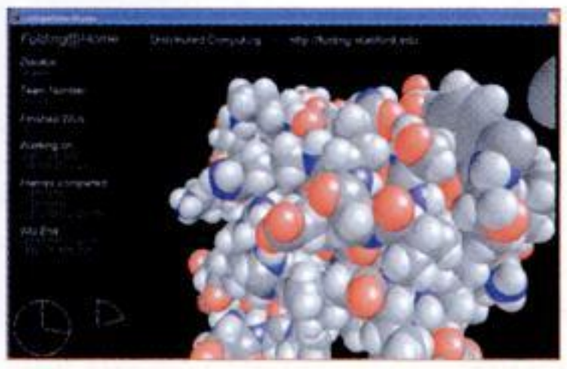
Join the Maximum PC Folding Team!

Fight disease with your PC's spare cycles

Since 2000, half a million people have donated their spare computing cycles to Folding@home, a distributed computing experiment led by Stanford University. This project helps unlock the mysteries of protein folding by remotely running folding simulations, allowing doctors to better understand the causes of various diseases such as Alzheimer's or Parkinson's.

Join *Maximum PC's* Folding@home team (currently ranked seventh in the world!) and be a part of this groundbreaking experiment. Simply download the software from **http://folding.stanford.edu** and join team number 11108. Once you're up and running, be sure to head over to our forums at **www.maximumpc.com/forums** to learn useful tips from our experienced team members. They'll grant you a warm welcome—we promise.



The more ponies you have under the hood, the more proteins you'll be able to fold.

Preview

Introducing Vista's SideShow

New widget-based tech integrates PDA functionality into your laptop—even when it's turned off

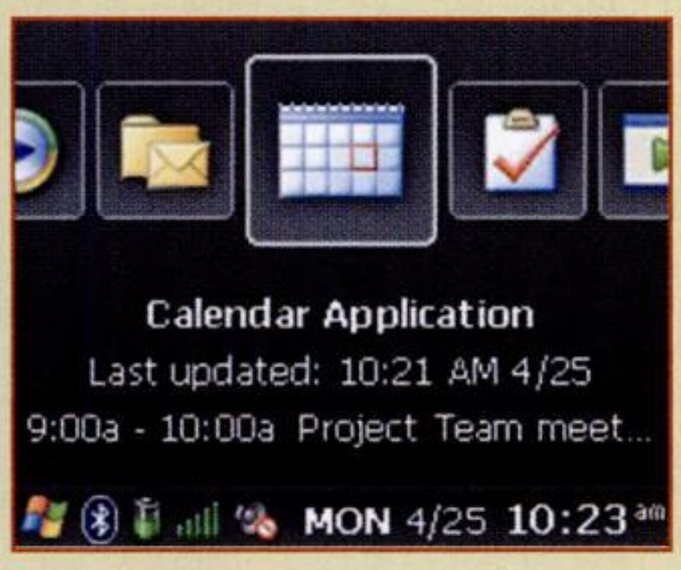
A new feature in Windows Vista, called SideShow, will allow laptop makers to implement an auxiliary information display that's accessible even when the notebook's lid is shut.

SideShow will allow manufacturers to implement a host of features on the secondary display, including everything from an appointment calendar to MP3 playback controls, that a user can access without ever turning on the laptop.

PortalPlayer, the company that makes the iPod firmware, is working on its own variant of the technology. A low-power CPU and a few megabytes of flash memory will reportedly power the SideShow devices. Don't expect to run *Unreal Tournament* on a SideShow screen; instead, apps will more closely resemble *Konfabulator* widgets. The auxiliary display should sip juice from the main battery; we don't expect it to have a large impact on battery life.

Nobody knows what applications Microsoft will make available for SideShow, or whether you'll be able to add your own widgets to the display.

We'd bet that the widgets will be similar to those designed for the Sidebar in Windows Vista. For a peek at what's available in Vista, check out **www.microsoftgadgets.com**.



FAST FORWARD

TOM **HALFHILL**

ARM Wrestles with the Clock

While everyone is watching the duel between AMD and Intel, there's another potentially revolutionary drama unfolding at two development labs in England and the Netherlands. The world's first commercial 32-bit microprocessor core implemented in asynchronous logic has shipped to a customer, and the first silicon chip based on that core is expected to arrive from the fab later this year.

What the heck is asynchronous logic, and why is it revolutionary? Asynchronous logic, also known as clockless or self-timed logic, is a method of circuit design that eliminates the conventional clock signals regulating today's microprocessors. An asynchronous processor doesn't have a fixed clock speed. When its circuits aren't busy, they stop. And when they're needed, they run only as fast as they have to. This concept differs from the sleep modes in conventional processors, which can temporarily idle some unneeded circuits. In a clockless processor, different parts of the chip run at different "clock speeds" at the same time, and often there are parts of the chip that don't run at all. It's a cool-running chip that sips power.

Engineers have been working on asynchronous technology since the 1950s, before microprocessors were even invented. When I first wrote about the latest project in 2004, the two companies—ARM, based in England, and Handshake Solutions, in the Netherlands—expected to ship their breakthrough processor core in early 2005. It didn't happen. They encountered obstacles that took a year to overcome. But now they have delivered the core (the ARM996HS) to an unnamed customer (I'm guessing Philips Semiconductors), which is fabricating the first chip.

It won't be a PC processor. That may come later, if the project succeeds. The first chip is probably a small controller for cars and consumer electronics. ARM is the leading supplier of processor cores in cellphones, where low power consumption extends battery life. This fledgling clockless CPU burns less than one-tenth of a watt under full load.

Better yet, simulations indicate that the ARM996HS has incredibly low peak-power spikes, because it's not working as hard as a conventional processor. ARM and Handshake Solutions have achieved an important milestone that could change microprocessors forever.

Tom Halfhill was formerly a senior editor for Byte magazine and is now an analyst for Microprocessor Report.

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GAME THEORY

THOMAS
MCDONALD

The Future of PC Gaming, Part 1

I have seen the future of PC gaming, and it's not on the PC.

I hate to break ranks and all, but it's been abundantly clear for the past few years that PC gaming is hurtin'. It's becoming a hobbyist market, and hobbyists can't muster big enough numbers to cover the ever-increasing costs of game development. Despite their continued ability to do complex strategy games and simulations better than any other platform, top-flight PC gaming rigs have simply become too expensive to maintain, and most of the games that drove that need are migrating to the less-expensive consoles, anyway.

In the past, this wouldn't have mattered, because the platforms simply couldn't compete with a high-end gaming PC. But consider the Xbox 360's spec chart. At its heart is an IBM PowerPC CPU with three 3.2GHz cores, as well as a powerful ATI graphics processor. The big lure is the native HiDef TV support with a resolution of 720p (1280x720 widescreen), which can be upscaled to 1080i (1920x1090 widescreen) or downscaled to 480i (4:3 ratio) for older TVs. The $400 bundle comes with a 20GB hard drive, and Windows Media Center allows it to reach out and stream media content from any PC on your wireless network. This is as close to a console-PC hybrid as we've ever seen, and it points to even greater convergence in the future.

It was *Call of Duty 2* that made me realize the days of playing first-person shooters on my PC was passing. The 360 can chug out a solid, silky 60 frames a second, and muster all of the impressive visual effects seen on the PC version. I don't know about you, but my PC doesn't have a 32-inch widescreen HiDef TV with an expensive surround-sound system, but my home theater does. *CoD 2* on a home theater is enough to convert even the most hardened PC-shooter loyalist.

Note that I'm talking about "the future of PC gaming;" not the present. For now, the 360 still has a couple of notable (but easily bridged) flaws, which I'll talk about next month, along with why I think next-gen consoles are actually good for PC gaming. Really!

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

Vista SKUs Revealed

Microsoft officially lifted the veil of secrecy off the different versions of Windows Vista. There are three consumer-based SKUs, two business versions, and three European-only versions. While we know the specific names and features of each version of Vista, prices are still unavailable.

For home users, there will be three flavors of interest: Vista Home Basic, Vista Home Premium, and Vista Ultimate. Let's take a look at each.

VISTA HOME BASIC: This bare-bones version will be very similar to XP Home. It's designed to run on modest hardware in a single-PC environment. Home Basic includes Windows amenities such as *Movie Maker* and *Media Player*, wireless networking, and other Windows utilities. It will not include the new 3D Aero interface. This one sounds like it's to be avoided.

VISTA HOME PREMIUM: The Home Premium Edition is the Peter Brady of the consumer versions of Vista, situated firmly in the middle. It includes all the features of Home Basic, plus Media Center functionality, DVD authoring, Tablet PC support, auxiliary display (SideShow) support, and many of the file-sharing and networking capabilities of Windows XP Pro. It's targeted at users with multiple PCs, enthusiasts, and notebook users.

VISTA ULTIMATE: Vista Ultimate is the "kitchen sink" OS, offering every possible feature a lad could want. In addition to all the features of Home Premium and business-class networking features, it will include a game-performance tweaker, access to online services for music and movies, and possibly rapid-response tech support as well as exclusive "Ultimate-only" applications.

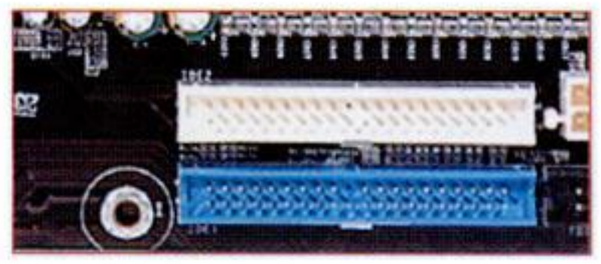
Skype, Intel Team Up

VOIP provider Skype added fuel to the Intel/AMD fire this month by crippling its service for AMD users. Intel dual-core users get 10-way conference calling, while dualie AMD folks have to settle for five-way calls. Though there have been whispers of kickbacks and incentives being thrown Skype's way, both parties insist no money has changed hands.

Skype™ - screenshotbot
File View Contacts Tools Call Help
Add Contact Search Conference Chat Send File
No new events € 2.54
Contacts Dial History Conference (3)
Conference call 4,254,894 Users Online

Intel Bids Adieu to PATA

According to a super-top-secret *PowerPoint* presentation unearthed by the editors of a Hong Kong tech site, and labeled "Intel Confidential," the chip giant is finally planning to jettison support for parallel ATA devices. The classified documents list AC 97 Audio and Parallel ATA as being queued for "legacy removal" in the upcoming ICH8 south bridge. Taking the place of the crusty old PATA ports will be two additional SATA ports, for a grand total of six SATA ports built into every Intel chipset.



Upside-Down Videocard!

Asus has developed an upside-down videocard named the EN6600Top Silent (not for sale in the U.S.). When wedged into a PCI Express slot, the card's GPU core and cooling apparatus are on top of the PCB, rather than underneath it. This allows the airflow around the CPU socket to cool the board's heatsink. Pretty cool, eh?

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Reality? Check.

momentum

speed

weight

[force]

inertia

action

In-Game PhysX Accelerated Footage

PhysX™ by ageia

AGEIA™ PhysX™ is the first and only physics processor enabling a totally new level of elite PC gaming with dynamic motion and extreme interaction. Massively destructible buildings, explosive collateral damage, and realistic smoke and fog are just some of the exciting new features enabled in this summer's hottest titles like Tom Clancy's Ghost Recon Advanced Warfighter™. Gaming rigs powered by the AGEIA PhysX processor are available now.

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Experience the new reality in gaming physics.

UBISOFT

GRIN

ESRB TEEN T Blood Language Violence

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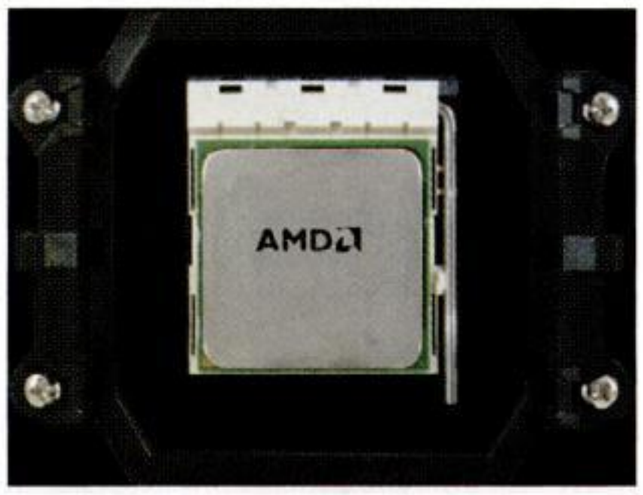

AMD's new retention module looks like it will work with existing Socket 939 coolers, but AMD hasn't confirmed backwards-compatibility yet.

AMD's New Socket Breaks Cover

The successor to AMD's much-loved Socket 939 has finally come out of hiding. Named AM2, the new socket will appear on Athlon 64 motherboards that support DDR2 memory. The new socket design also sports a tweaked retention module that mounts to the mobo using four screws for a more secure fit (the current design uses two screws). Socket AM2 is scheduled for a June launch.

Do You Need a UMPC Device?

Microsoft's custom palm-top OS could start a portable computing Renaissance

If you're like us, you lug a hefty smartphone, notebook computer, and MP3 player everywhere you go. Well, Microsoft hopes to combine all these devices into one, with its new custom operating system designed for touch-based computing. If you're thinking it sounds a little like Tablet PC, you win a gold star. The UMPC operating system uses the same core technology as Tablet PC, with a few extra tweaks to make touch-screen computing more accessible.

With a paperback book-sized computer running Windows XP, a persistent Internet connection, and a full complement of Windows apps, our load just might get a lot lighter. Expect to see UMPC formfactor rigs shipping in May, for between $600 and $1,200.

Shader Model 3.0 Arrives

At the launch of nVidia's 6800 series of videocards, Shader Model 3.0 was listed as one of the cards' most important features (primarily because ATI's cards didn't support SM3 at the time). Now that ATI's X1800 and X1900 cards are also riding the SM 3.0 bandwagon, what does Shader Model 3.0 support mean to you? And does it matter?

The biggest difference between Shader Model 2.0 and 3.0 is the length of the shaders. In version 2.0 shaders, programmers were limited to 96 instructions. In SM 3.0 shader programs that number increases to 65,000 instructions. Though that certainly seems like a vast improvement, keep in mind that the average length of a shader in one of today's games ranges from around 12 instructions to 25 instructions.

While *Far Cry* stands out as a shining example of SM 3.0's advanced capabilities, we have yet to see another SM 3.0-supported game that offers a discernibly different experience on a 3.0-capable card. Below is a list of all the games, both on shelves and in production, that support Shader Model 3.0.

CURRENT GAMES:
Far Cry
Timsehift
Juiced
Splinter Cell: Chaos Theory
LOTR: BFME
Age of Empires III
Starship Troopers

GAMES IN DEVELOPMENT:
Stalker
Unreal Engine 3 titles
Elder Scrolls IV: Oblivion
Tomb Raider: Legend
Neverwinter Nights 2
Hellgate: London
Company of Heroes
Project Offset
Call of Juarez

FUNSIZENEWS

EVERY VERSION OF VISTA ON DVD

According to a report on system integrator website CRN.com, Microsoft will ship every version of Vista on every DVD it ships, to allow easy upgrading and installation. It will let home users upgrade their version of Vista at any time via the control panel, and will also let system builders and IT jockeys load any version of Vista from any Vista disc.

Windows Vista™

MICROSOFT DISSES OPENOFFICE

When questioned about the open-source office-suite rival OpenOffice.org, Microsoft execs recently said the free office suite was great—for someone living in 1996. "*OpenOffice* is really designed to solve the problems that Microsoft focused on 10 years ago," said Alan Yates of Microsoft. "*OpenOffice* is fine if you have very limited needs." Count us as folks with "limited needs" then; Editor in Chief Will Smith used *OpenOffice* exclusively for most of 2004.

JOIN THE CORPS

If the idea of traveling around the world and attending third-world geek-fests sounds appealing, head over to GeekCorps.org. This technology-based version of the fabled Peace Corps sends people to far-flung locales to help get the local population up to speed on current technology.

AMD KICKS OFF 2006 WITH A BANG

The retail numbers for the early weeks of 2006 are in, and so far AMD is mopping the floor with Intel, at least in the retail market. During the first seven weeks of 2006, AMD captured 80 percent of the retail desktop market, with Intel taking the remaining 20 percent. One analyst described the situation as an almost complete reversal of the respective companies' normal market positions.

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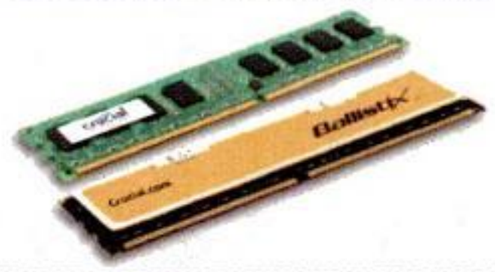
You crave it. You demand it. Your game depends on it. It's more performance, and that translates into more memory. Whether you're a casual enthusiast or a hard core game connoisseur, Crucial.com has the density you need (and the price you want) on high-performance, low-latency memory to help you get the most out of your system.

- **Limited Lifetime Warranty**
- **Free Technical Support**
- **Expert Online Assistance**
- **Free Shipping on Qualified Orders**
  (For a limited time, on orders of $40 or more shipped within the contiguous US.)

GAMERS *Need high-density, low-latency gaming memory?*

Games play better with more memory! Don't settle for stuttery (hiccupy), barely playable games – a memory upgrade can boost system performance and make your gameplay more enjoyable. When you're playing today's demanding new game titles, adding RAM helps boost frame rates and shorten load times.



MODDERS *Is bling your thing?*

If you like to trick out your case and show off at LAN parties, the eye-candy Ballistix™ high-performance memory line is right on target, designed for gamers and power users seeking maximum system performance, stability, and BLING! Ballistix memory comes with an eye-catching black PCB and gold integrated heat spreaders. Ballistix Tracer™ modules, unlike other illuminated memory, feature two rows of lights that actually correspond to real-time memory activity. Ballistix Tracer memory also comes with a black PCB, black integrated heat spreaders, and blue ground-effects lights.

TWEAKERS *Need stable RAM that won't melt down under your custom settings?*

Slow system memory can cripple your cutting-edge processor! The Ballistix high-performance memory line was developed specifically for serious gamers and power users who are trying to squeeze every bit of performance out of their systems. You want advanced speed grades, low latencies, and integrated heat spreaders to keep the memory running cool – things that are really important in delivering a next-generation computing experience.

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VOIP **vs.** Analog Phone Service

Every month, you get that bill from the phone company. It's 20 or 30 bucks just for the privilege of having an old-fashioned, analog phone, and maybe a bonus feature or two: voicemail, perhaps, or Caller ID. Then there's the long-distance bill, where you're charged per-minute for any calls outside your "local calling area." The whole thing just seems so 20th century.

By comparison, voice over IP (VOIP) tech is like a brave new frontier, free from regulation, state fee surcharges, and pesky per-minute long-distance. But like any new tech, VOIP's got some ugly warts. Is it time to make the jump, or will your POTS—that's plain old telephone service—still be in effect this time next year?

BY WILL **SMITH**

round 1

SOUND QUALITY

Barring some sort of horrible wiring problem in your home or neighborhood, your analog phone line should sound pretty damn good. Quality on the VOIP line can vary wildly, depending on your phone adapter, your provider, and even the amount of data you're downloading using your computer. When the quality is good, it's excellent—Skype's encrypted service sounds better than an analog phone call. But the quality of unencrypted services, such as Vonage, can suffer minor pops and hisses, similar to what you might get from a cellphone. **WINNER: POTS**

ANALOG PHONE SERVICE
Generic phone,
$10, available anywhere

round 2

PRICE

This is where all of the current VOIP providers have a huge advantage over the traditional telcos. Vonage's all-you-can-use plan for unlimited nationwide calling starts at $25/month. The lowest price we could find for local service from SBC was $22/month—any features, including voicemail, and long-distance service will cost you extra. And it will certainly cost you more than the $3 jump to Vonage, which not only offers nationwide calling, but voicemail (with email and web access to your messages), caller ID, and an online listing of all your incoming and outgoing calls. We love checking voicemail over the Internet. You'll never have to press 3 again! With free long distance, cheap international calling, and tons of cool bonus features, VOIP wins this category hands down. **WINNER: VOIP**

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round 3

EMERGENCY SERVICE

Currently, some VOIP customers receive only basic 911 service, instead of the enhanced 911 that traditional POTS line subscribers receive. If you have enhanced service, the 911 operator will automatically know your phone number and address when they answer your call. Basic service is more like cellular 911 coverage—you have to verbally tell the operator where you are. Enhanced 911 for VOIP is supposed to be available nationwide as we go to press; however, we've heard plenty of reports that the service remains elusive.

WINNER: POTS

round 4 **RELIABILITY**

There aren't really any reliability concerns with standard analog phone service—you set up your service, plug in a phone, and it just works. When the line goes down, the phone company comes and fixes it within a day or so. VOIP, on the other hand, does have some reliability issues. The biggest problem is that when your broadband dies, so does your phone service. Sure, you can use your cellphone for backup, but in the event of a Katrina-level disaster that overloads your cellular provider, you could be left high and dry without any kind of phone at all. **WINNER: POTS**

VOIP
Linksys Vonage PAP2, $50, www.linksys.com

round 5 **CONVENIENCE**

Think about it: VOIP providers offer you the features you want, without charging you an arm and a leg for them. We haven't heard of a single Baby Bell emailing your voicemail messages to you or allowing you to keep your phone number no matter where you live. Heck, if you ask your local phone provider to set up a new line for you in San Francisco using a New York City phone number, they'll laugh heartily. VOIP providers make it easy for you to have call-in numbers anywhere you want them. Not only do you not pay for long-distance, but the people calling you don't have to either.

What's more, with VOIP, your phone number works anywhere in the world that you have a broadband connection. If you tote your phone adapter to Tokyo, you can plug it into your hotel's broadband connection, and make calls (and be called) just like you were sitting on your couch. **WINNER: VOIP**

And the Winner Is...

As much as we want to love VOIP, it's not quite ready to serve as the primary line in most homes, so we have to declare POTS the winner. With small children, the lack of enhanced 911 services alone should make you shy away. After all, your two-year-old won't be able to tell the 911 operator you've had an accident—you'll be doing good if she manages to push the 911 button on the phone.

Now, with that concern out of the way, a VOIP line is perfect as a second line for the kids, or as a second (and third, and fourth, and fifth) line for your home office. And that's without even considering the features VOIP offers over a standard phone line. Try and get your home phone to ring you when you're on the road, and you're going to end up eating huge long-distance bills. MPC

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Kody, Watchdog of the month

Our consumer advocate investigates...

✓Pavilion Settlement ✓CCDs ✓Antec PSUs ✓Underclocked BFG Board

HP SETTLES PAVILION LAWSUIT

Hewlett-Packard has settled a class-action lawsuit that alleged several models of its Pavilion computers had defective motherboards that would cause the computers to freeze or hang. HP is settling the suit without admitting any wrongdoing, but the Internet is full of tales of hanging and booting problems with the affected models. The settlement is tiered, so compensation depends on a consumer's particular model.

Owners of the Pavilion 8655c, 8660c, 8750c, x1756, or x1759, who purchased their machines on or before January 1, 2004, and subsequently contacted HP for technical support are entitled to $75 in cash, a $50 discount certificate, and up to $750 reimbursement for cash the consumer spent trying to fix the problem independently.

Owners of the Pavilion 8754c or 8755c, who purchased their machines on or before January 1, 2004, and subsequently contacted HP for support will get $40 in cash, a $50 discount certificate, and a reimbursement for repairs up $750.

Consumers who purchased any of the aforementioned Pavilion models on or before January 1, 2004, but did not contact HP for support are entitled to a $50 discount certificate.

More information on the settlement is available at www.hppavilionsettlement.com.

THE FORD PINTO OF ELECTRONICS

*In the March 2006 issue, **Maximum PC** reviewed the Minolta Dimage X1. I think the Watchdog should warn prospective purchasers of problems that Minolta has had, and is still having, with its digital cameras. According to the service website, Minolta is recalling certain models because of manufacturing problems with the CCD. While it's not one of the cameras on the list, my Minolta Dimage E223 is exhibiting exactly the same symptoms as the recalled cameras — blurring and unnatural colors — which makes the camera useless.*

I'm SOL because there's no warranty and the repair price would be $250. The CCD is obviously defective and, judging by the recall of some models, Minolta obviously knows this. My eight-year-old Casio is still chugging along while my Minolta is a paperweight. Minolta, in my book anyway, deserves a huge "woof"!

— Brian Mahoney

The Sony F717 is among many camera models that might have a defective imaging sensor.

Brian, there's good news and bad news. First the good news: The Minolta X1 we reviewed contains a newer CCD that should not have the blurring problems your camera does. The really bad news is the widespread presence of potentially defective CCD modules in 100 different models of cameras and camcorders. The bad CCDs affect cameras made by Minolta, Fuji, Canon, Nikon, Pentax, Olympus, Ricoh, and Sony.

Sony manufactured the chips in question, and according to a news story from Japan-based Nikkei Electronics, the problem stems from the company's efforts to increase production. "To boost the line's productivity, Sony changed the settings of a wire bonding system in the course of manufacturing process enhancement. As a result, the joint between wire and electrodes became weaker than before then," the article said. Sony has since corrected the problem, which was only in cameras made between 2002 and 2004, and which is exacerbated by high humidity or high temperature climates. One camcorder manufacturer the Dog spoke to described the issue as the "Ford Pinto" of electronics.

Among the models affected: Canon's popular PowerShot A60, A70, and SD110 series; Fuji's S2 Pro digital SLR; Konica's Dimage A1, 7i, and X2; Nikon's Coolpix 5700; Olympus' C-5050; Pentax's Optio 330RS; and Ricoh's RX. The bad CCDs hit Sony the hardest and affect the Cyber-shot DSC-F717, in addition to 21 other models of digital cameras and more than 50 models of its camcorders.

The total number of cameras affected is far too many to list here, but you can find a complete list and what the individual companies are doing to correct the problems at www.imaging-resource.com/badccds.html. The fixes range from Sony promising to repair cameras with a bad sensor up to October 2, 2007, to Olympus pledging to repair cameras even if they haven't failed. Some companies, including Canon, haven't put any time limit on the repair.

Although the companies are responding to the issue, they're not exactly going out of their way to alert consumers. Perhaps they're just hoping that consumers will assume two to three years is the normal life of the camera and simply ditch it for a newer model with more megapixels. Woof

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com.** The Dog promises to answer as many letters as possible, but only has four paws to work with.

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Antec has changed a circuit in its newer Neo HE PSUs, to work with two Asus motherboards

PSU AND MOBO DON'T MIX?

Maximum PC *is my only source for the truth, so I hope you can help me with this. I have an Asus A8N32-SLI motherboard and an Antec True Power 2 PSU. I have not built the system yet, as I'm lacking the GeForce 7800 GTX, but I am starting to hear that this mobo and PSU are incompatible. Do you know anything about this? Thanks in advance.*

—Chris Grizzuto

The Dog spoke to Antec about the issue and verified that the True Power 2 works fine with that board. Although, there is a reported incompatibility with Antec's Neo HE series and both the Asus A8N32-SLI and A8N-SLI boards. When contacted by the Dog, Asus officials directed us to Antec. Antec officials said the problem is related to a particular circuit in the Neo HE that causes boot failure and sporadic crashes in some systems. Antec officials said the latest BIOS from Asus sometimes corrects the issue. Others might have to use the auxiliary power connector on the motherboard, or possibly exchange the unit. Antec pulled a Han Solo, saying "It's not my fault," but the company has made a slight design change in the Neo HE that's currently shipping.

UNDERCLOCKING VOIDS WARRANTY?

I built a new system using a BFG Tech GeForce 6800 GT in an MSI K8N Neo 2 motherboard with an Athlon 64 FX-55. With the normal desktop everything seemed fine, but as soon as I tried to play video or any graphics-intensive game, CPU usage went up to 100 percent, and video quality was shot—I had polygons all over the screen, sometimes requiring a reboot.

I ended up RMA'ing my PSU and motherboard, but the problem did not go away until I down-clocked the videocard from its stock speed. This worked for a few months, but the card recently began acting up again. When I called BFG, I was told my warranty was void because of my underclocking. What gives?

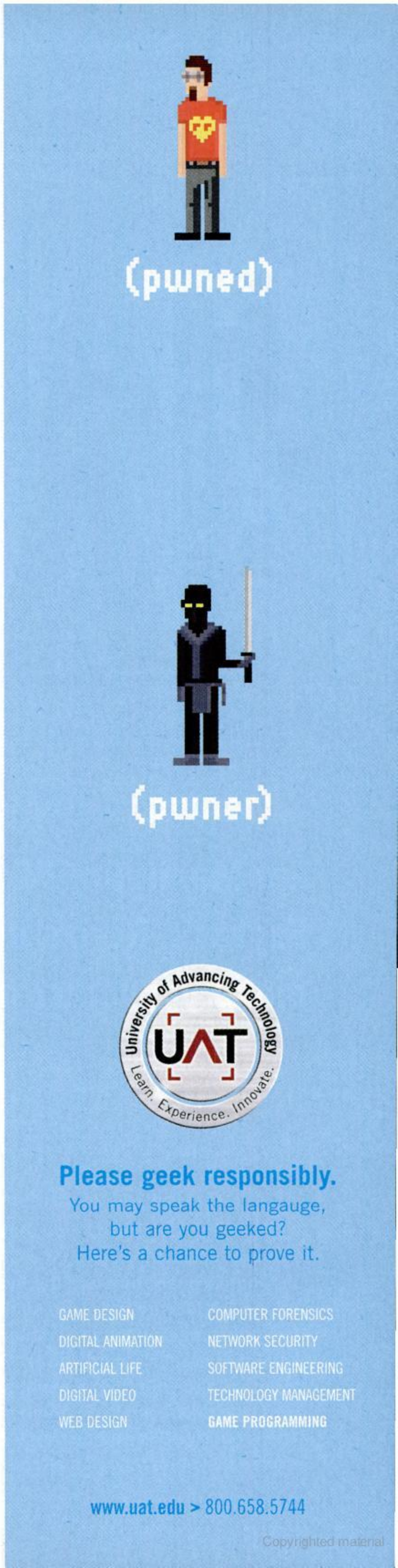
— Mike Harris

BFG's warranty forbids overclocking ***and*** underclocking.

The Dog pinged a BFG official who said: "BFG Technologies' warranty states that modifying or tampering with the card does void the warranty. In light of this, we suggest that customers having issues contact BFG technical support first, instead of making any changes to the card themselves, to avoid the warranty being voided. In this particular case, multiple steps were taken with BFG technical support before the customer down-clocked his card, so we will contact the customer and work with him to resolve the issue to his satisfaction." MPC

LET SLIP THE DOGS OF, ERR, THIS COLUMN

The Watchdog is looking for more dogs to represent this column. If you believe your dog is a worthy Watchdog, send a focused, high-resolution headshot of the canine, along with its name, to watchdog@maximumpc.com.



HARDCORE HARDWARE

Let Maximum PC ease your transition from AGP to PCI Express. Here's everything you need to know before you make your next motherboard, CPU, and memory upgrade

BY GORDON MAH UNG

TEN YEARS AGO, you really could build a PC in a vacuum. You bought a CPU, then picked the motherboard that had the features you wanted. All the CPUs used the same socket, so you could use any motherboard you wanted. Then you'd pick whatever graphics card you wanted, slap the parts together and your dream machine was complete. Unfortunately, things are much more complex today. The modern PC is an interconnected organism, where each subsystem relies on all the others.

Now the CPU doesn't have to just fit the socket, it also has to be compatible with the chipset and memory. DDR RAM simply doesn't work with a DDR2 mobo. And if you want dual graphics cards, you'll need to pick the right motherboard for the job, or you'll be the guy sheepishly trying to return two $500 videocards at the local CompuBin.

We know you've got questions about your next upgrade, so we're here to get you up to speed and help you make the right choices before you buy your next motherboard and CPU.

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RE

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CPU BUYERS GUIDE

We eat, drink, and breathe technology news everyday, and even we have trouble keeping the CPU models straight, so don't feel bad if you can't

How Many Cores Do You Need?

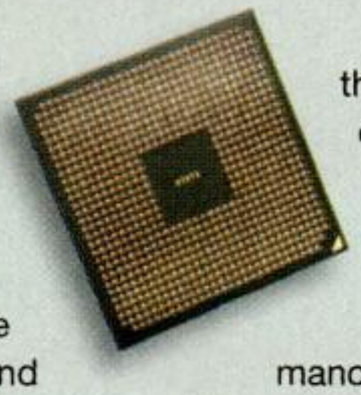
The number of CPU cores you need depends on how you use your computer. Do you typically perform only one task at a time, or do you frequently mix up your tasks, bouncing between different programs running simultaneously? If you're a unitasker, a single-core processor is probably your best bet, right now. Single-core CPUs usually run at higher clock speeds than dual cores, and when doing just one thing, they're usually faster. Mind you, this won't always be the case. We predict that over the next couple years, the majority of applications will be written to take advantage of dual cores.

Dual-core CPUs feature two complete CPU engines inside a single package; and while the pair of CPU cores usually runs at a slower clock speed than a comparably priced single-core CPU, they share the processing load, which can actually boost performance over a single core, especially for multitaskers, or in applications written to take advantage of multiple CPUs.

Which Brand is Right for You?

We've loved the unbelievable performance of the Athlon 64 CPU since its introduction, and we have absolutely no problem saying AMD is top-dog, especially if you're a gamer. The same holds true if you're using an application with a lot of floating-point math, or that hasn't been recently rewritten and recompiled for the Pentium 4's NetBurst architecture, such as Adobe's *Premiere Pro* series. The upshot is: Unless an application you need screams on Intel, we recommend you roll with the Athlon 64.

Which is the Right AMD Processor?



AMD's lineup includes the budget Sempron, the mainstream Athlon 64, the dual-core Athlon 64 X2, and the performance-oriented Athlon 64 FX series. We recommend you stick with Athlon 64 and up—the Sempron just doesn't have enough oomph, and you can get slower-clocked Athlon 64s at competitive prices.

AMD rates its Sempron, Athlon 64, and X2 processors with model numbers, such as 3200+, 3800+, and 4800+. The difference is mainly in the CPU's clock speed, the amount of onboard cache it includes (more is better), and the number of cores it houses. A good way to determine a CPU's performance relative to the others is to remember that the higher the model number, the faster the chip will perform.

AMD's FX line is designed for gamers and performance-minded folks. The company makes two FX chips: the single-core 2.8GHz FX-57 and the dual-core 2.6GHz FX-60. If you're looking for top performance, both chips will give it to you, whether you go for one CPU core or two.

Which is the Right Intel CPU?

Intel's lineup is a bewildering mess—we could write an entire feature on just how to decode the company's Rube Goldberg-esque naming scheme. There's the budget Celeron D, the midrange Pentium 4, the dual-core Pentium D, the single-core Pentium 4 Extreme Edition, and the dual-core Pentium Extreme Edition processors.

To further confuse matters, some of the Pentium processors support 64-bit OSes and some don't. All you need to remember is that for each family, the higher the number, the higher the performance. A Pentium D 950 is faster than a Pentium D 930 or 820.

The other big variable is Hyper-Threading. On the company's single-core chips, Hyper-Threading gives the processor a second virtual CPU core, so applications can use different areas of the CPU at the same time. Intel enables Hyper-Threading on its dual-cores and calls them Extreme Editions. If you're buying a dual-core CPU, it usually isn't worth the extra cash to enable Hyper-Threading. We think Intel's sweet spot is in the 9XX-series Pentium D chips. Avoid Celeron D chips, which are limited to a 533MHz front-side bus.

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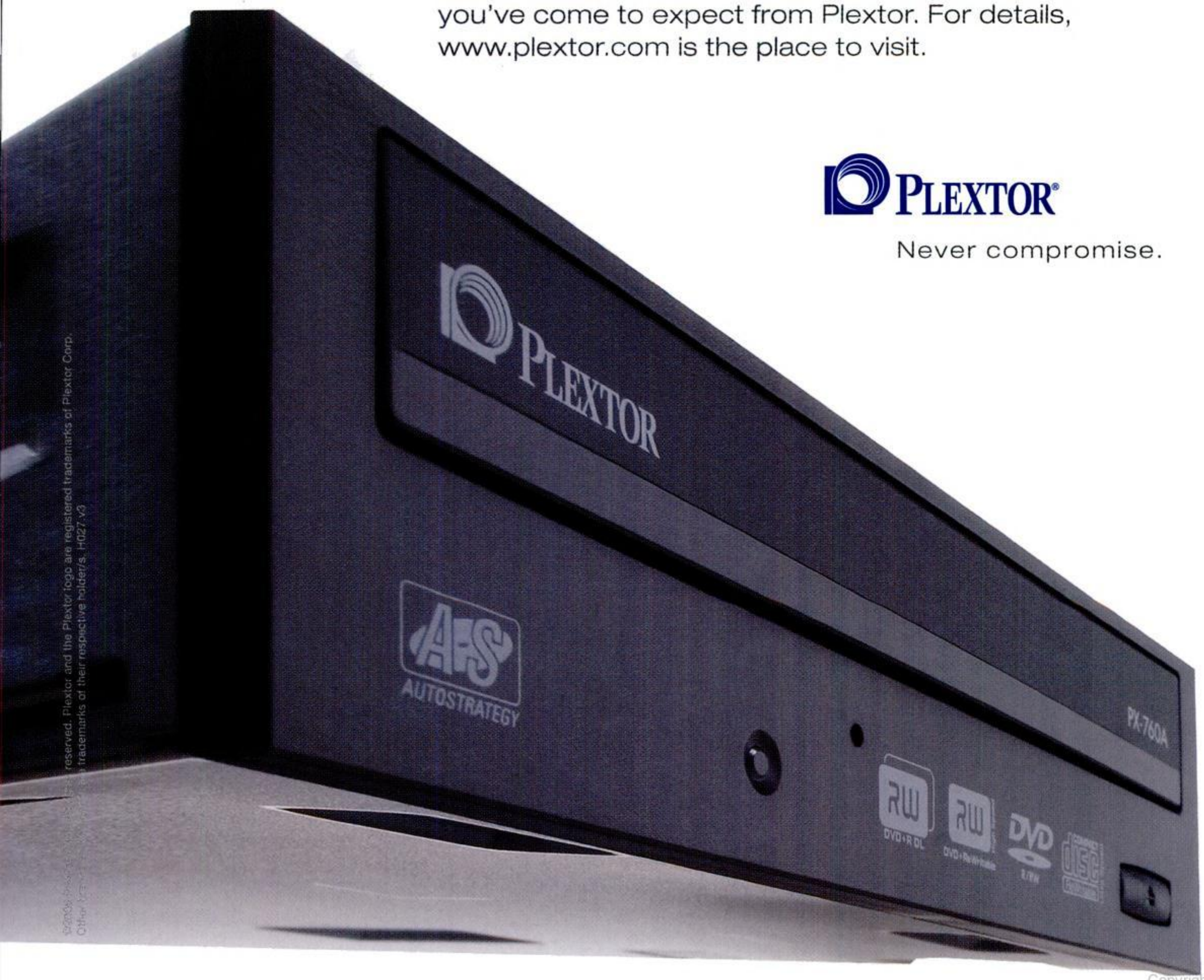

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Dual Graphics Cards or Not?

For gamers, dual graphics cards let you achieve far higher frame rates (and image quality) than you ever could using a single graphics card. After all, two cards are better than one! ATI's dual-card technology—called CrossFire—is supported on certain ATI and Intel chipsets. nVidia's solution—dubbed SLI, or Scalable Link Interface—only works on motherboards using an nForce4 SLI chipset. You'll have to decide what videocard brand you want to run before you purchase your motherboard.

Then there's the issue of PCI Express bandwidth. Newer PCI-E motherboards have two full-speed x16 PCI-E slots, while older motherboards deliver only a pair of x8 slots to the videocard. The upshot is that videocards that support up to 8GB/s of data throughput per card were plugged into motherboards that only support 4GB/s per card. Newer chipsets such as ATI's CrossFire Xpress 3200 and nVidia's nForce4 SLI x16 support dual x16 slots, so this is less of a problem going forward. Not that it was ever a huge issue in practical terms, as today's games don't really need the full bandwidth that x16 connections offer. It just doesn't make sense to spend money on a x8 motherboard when x16 parts are available.

RAM BUYERS GUIDE

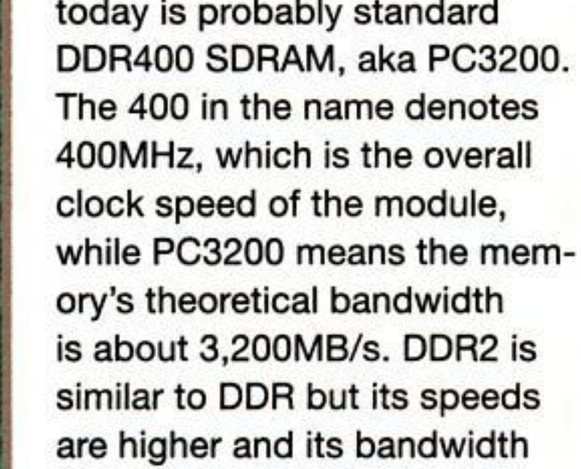
There are only two types of memory in common use today, but if you don't know what to buy, you can spend a ton of money on RAM that you don't need

Selecting the Right Type of RAM

Current AMD systems use DDR SDRAM, but with the company making the move to DDR2 this summer, that will become the de facto standard for all mid-range and high-performance PCs—not just Intel rigs. DDR2 increases bandwidth by allowing much higher clock rates and sending larger chunks of data at a time. For Intel, we recommend a motherboard that runs DDR2/667. If you're buying an AMD rig right now, you're stuck with DDR.

A Memory Clock Speed Primer

The most common memory today is probably standard DDR400 SDRAM, aka PC3200. The 400 in the name denotes 400MHz, which is the overall clock speed of the module, while PC3200 means the memory's theoretical bandwidth is about 3,200MB/s. DDR2 is similar to DDR but its speeds are higher and its bandwidth greater. A DDR2/667 module has an effective clock rate of 667MHz and is often referred to as PC5300 (denoting a theoretical bandwidth of 5,300MB/s). We refer to RAM by its effective clock speed rather than its theoretical bandwidth.



Get the Right Number of Modules

All modern motherboards support running two sticks of memory together in a "dual-channel" mode to increase bandwidth. In order to run in dual-channel mode, you have to buy memory in matched pairs. If you want a total of 1GB of memory, you need to buy two 512MB sticks. If you want 2GB, you'll need to buy two 1GB sticks, or four 512MB sticks of RAM. As a side note, you must install the memory in the correct channels to get dual-channel mode; your motherboard manual will detail the proper positioning.

How Much Memory is Enough?

The minimum amount of memory we'll put in any kind of machine today is 1GB, but 2GB is rapidly becoming the standard. We've measured huge performance gains in some games by upgrading to 2GB. Many RAM hungry applications, such as Adobe's *Photoshop*, are downright memory hogs. We don't expect memory configs to exceed 2GB until there's a viable 64-bit version of Windows available. Getting more than 2GB working in a 32-bit version of Windows XP is extremely problematic.

Next-Gen Memory Unveiled

Around the middle of 2006, we expect to see both Intel and AMD shift to the next speed bin of DDR2: DDR2/800. Because AMD's memory controller is located inside the actual CPU core, the company's DDR2 support will be tied to a new CPU and socket. We expect Intel to support DDR2/800 memory in a new chipset that will be paired with the next-generation Conroe CPU.

Just when you've stocked up on DDR2 RAM, you can expect it to become obsolete. Memory manufacturers are already spooling up DDR3 designs to replace DDR2. DDR3 will lower voltage to 1.5 volts from DDR2's 1.8 volts, which should be a boon for notebook users. DDR3 increases data rates by prefetching eight bits of data instead of the four bits of data that DDR2 does. DDR3 DIMMS will start to trickle out at the end of 2007.

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FOR YOUR UPGRADING CONSIDERATION...

Feast your eyes on these five mobos, which represent all the major enthusiast chipsets. Odds are, you'll find the perfect mobo for your next upgrade right here!

Asus P5WD2-E Premium

Asus has a message for the quiet-PC people who bitched about the 8,000rpm fan it used on the A8N SLI-Deluxe: "We hear you loud and clear." The P5WD2-E (as well as Asus' Athlon 64 board reviewed on page 26) eschews chipset fans in favor of passive heatsinks.

It helps Asus that Intel's 975X chipset doesn't require a ton of cooling to keep temps down. Unlike the exotic heat pipes and wind tunnels found on some mobos, Asus uses a pair of plain-looking aluminum heatsinks to keep the north and south bridges cool.

Officially, the board only supports ATI's CrossFire multi-videocard technology, but like the other 975X-based motherboard in this roundup (Gigabyte's GA-G1975X), Asus also includes an SLI connector for using two nVidia cards in tandem. Wishful thinking, perhaps?

In terms of board amenities, Asus aces the Gigabyte board with support for eSATA and eight SATA ports. Asus took the conservative route, however, with the add-in board configuration—there are three 32-bit PCI slots, two physical x16 PCI Express slots, a x2 PCI-E slot, and a x1 PCI-E slot. The P5WD2-E isn't the greatest board for people who plan to add a lot of PCI-E devices, but there really aren't a ton of PCI-E devices available now.

Asus also continues to provide the best manuals, replete with details on the board's inner workings that the other guys expect you to figure out on your own.

The board might be out-blinged and out-featured by Gigabyte, but the P5WD2-E is no slouch. With virtually no performance difference between the two boards, we say buy the one that appeals to you.

Asus' 975X motherboard sports more PCI slots than it does new-fangled PCI Express slots.

Our only reservation about this board (and all 975X chipset boards) is whether it will support Conroe.

ASUS P5WD2-E PREMIUM
$225, www.asus.com
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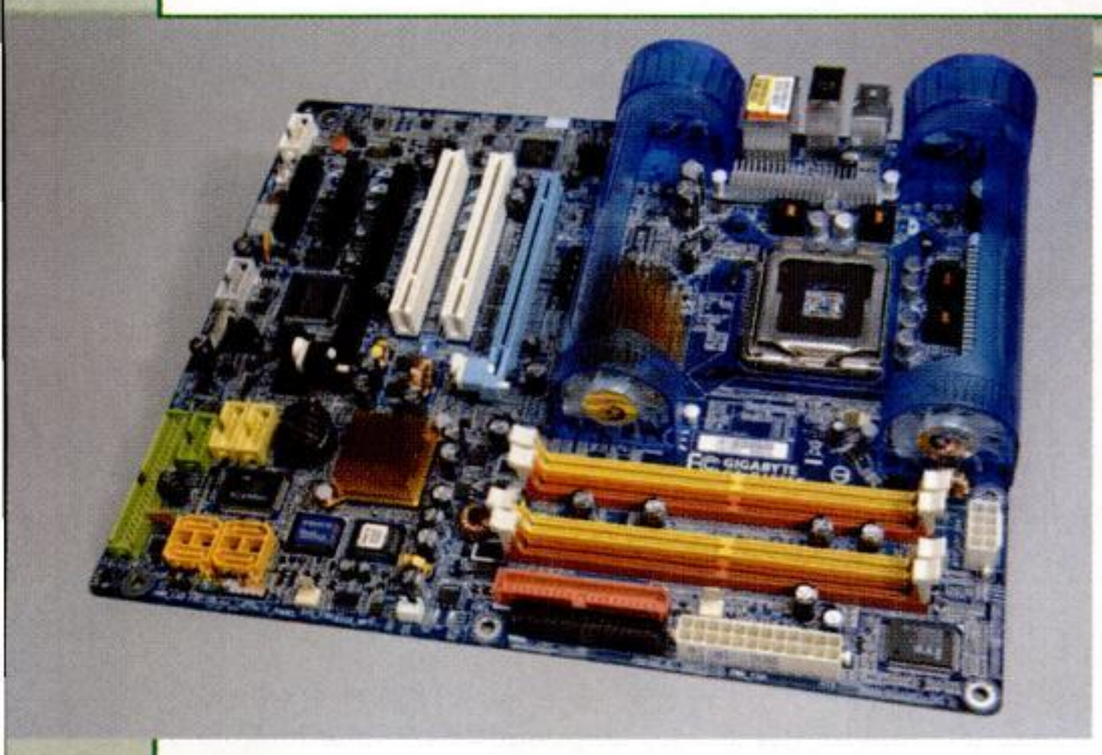

Gigabyte's latest 975X motherboard is the mobo equivalent of 22-inch rims.

Gigabyte GA-G1975X

Gigabyte's GA-G1975X has more personality than any motherboard we've tested in years. The board features the distinctive "Turbojet Technology," which is designed to lower the temperature of the north bridge, voltage regulators, and RAM, using a large fan shroud. It's the exact opposite of Asus' minimalist cooling-solution board. The GA-G1975X is in your face and, depending on your taste, is either way cool or *très* tacky. The shroud, with its four integrated fans, is noisier than normal, but it's the perfect solution for water coolers who want to be absolutely certain the components around the CPU socket won't overheat.

We appreciate the extra effort Gigabyte took to cool the mobo, but there's a significant trade-off. The fans eat up almost all of the I/O shield panel space. Because both "jets" exhaust through the I/O shield, there's room for just two USB ports, one Gigabit Ethernet port, three audio ports, and two PS/2 ports. You'll add the rest of the typical connectors using slot-cover adapters. If you need to run all of the extra connectors, you'll eat up almost all of your expansion slots.

Although the GA-G1975X includes only four SATA ports—the bare minimum, in our opinion—Gigabyte loads up on other features such as a board-mounted power switch, a POST LED, and the company's trademark dual BIOS. Gigabyte also ditches HD Audio for an onboard Sound Blaster Live chip. The Live isn't an X-Fi or even an Audigy 2, but it is beefed up with a 24-bit Wolfson DAC.

Even though most motherboards support the ability to revert a corrupted BIOS from disc, the dual BIOS does eliminate much of the pucker factor some people get when updating. Additionally, the GA-G1975X provides more PCI-E slots than Asus' 975 board, but fewer PCI slots.

Although, stability and performance with the GA-G1975X are acceptable, its noisy, overkill cooling solution leaves us cold.

GIGABYTE GA-G1975X
$225, www.gigabyte.com
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Continued on page 26→

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MSI K8N Diamond Plus

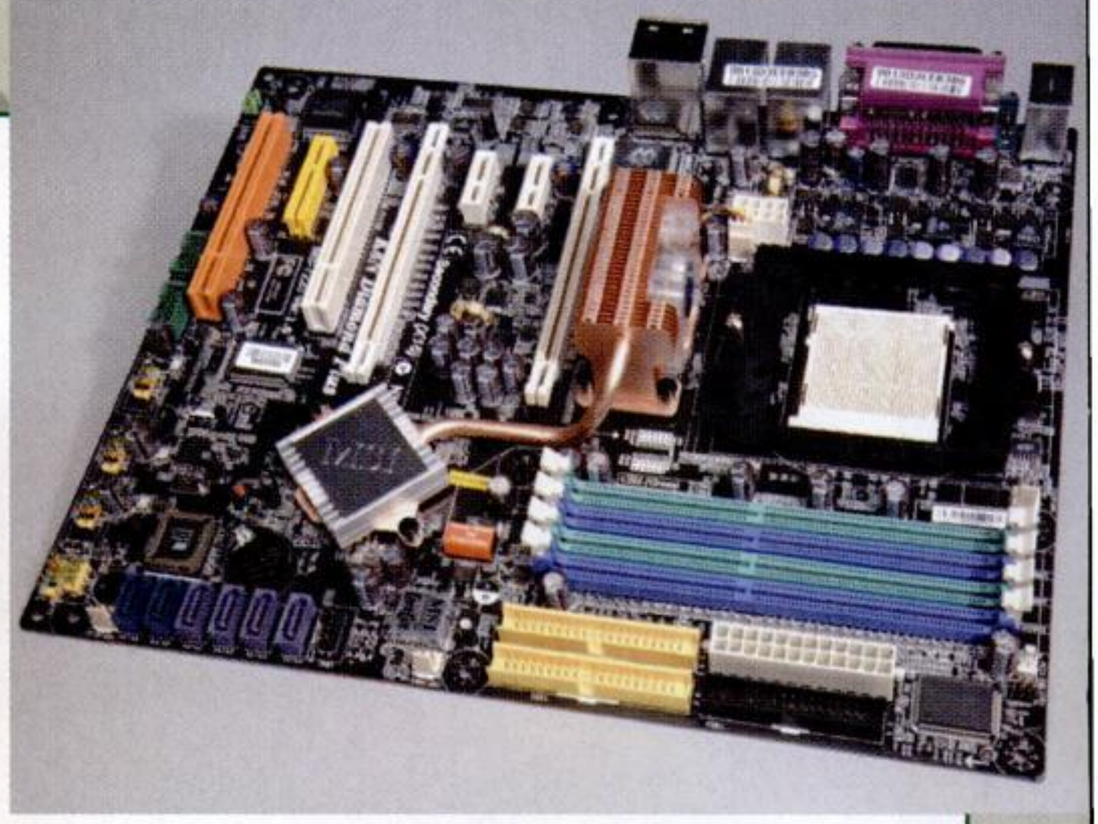
As the sole available mobo powered by nVidia's nForce4 SLI x16 chipset, Asus' A8N32-SLI Deluxe has had an easy three months.

That run might be over, now that we've had a good look at MSI's new K8N Diamond Plus. As the second motherboard to feature the dual x16 PCI-E chipset from nVidia, the K8N is good news for nVidia, which has faced conspiracy accusations from consumers who think the 32-channel chipset is vapor.

While the K8N is up against two ATI-chipset motherboards here, we suspect that most will want to see how the K8N does against the A8N32-SLI. Although we didn't formerly review the A8N-SLI here, we fired up the board and tested it alongside the others. Performance-wise, the two nVidia-powered boards were deadlocked. So it comes down to feature sets. Again, it's pretty durn close. Both use heat pipes—MSI chose active cooling while Asus lets you decide whether to use an active or passive cooler. And both have six SATA ports (Asus plumbs one port out the rear of the motherboard for eSATA).

But the MSI board clearly trumps the A8N32-SLI in audio. The MSI board features the Creative Audigy SE chip. You get hardware audio acceleration and a hiqh-quality 24-bit Wolfson DAC—far superior onboard sound than the AC97 audio on the Asus board.

MSI's board also features a driver-finder application, which kicks serious ass. The included application downloads and installs driver updates, and will even flash the BIOS. We also like this board's convenient CMOS reset button as well as the LED POST diagnosis display bracket, but MSI forgot to put a surface-mounted LED on the motherboard to tell you that the system is drawing power. That's been a standard feature since about 1998.



Finally, another nForce4 x16 board! MSI's version offers an Audigy SE soundcard on the mobo.

Because performance is virtually the same for the two nForce4 SLI x16 boards, we've got to give the edge to the MSI K8N Diamond Plus for sporting a few unique key features.

MSI K8N DIAMOND PLUS
$225, www.msicomputer.com
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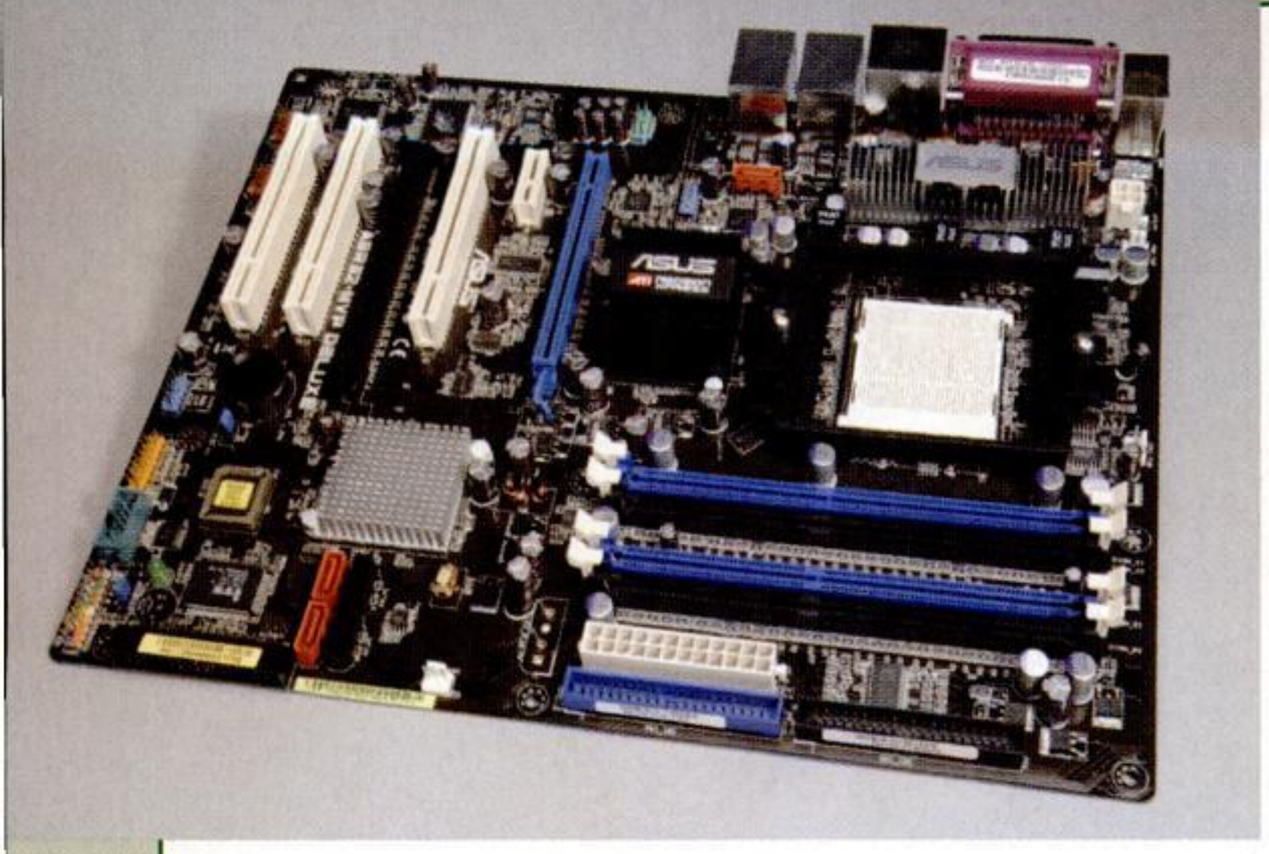
MAXIMUM PC KICKASS



Asus' new A8R32-MVP features a single-chip CrossFire implementation with support for two x16 PCI-E graphics cards.

Asus A8R32-MVP Deluxe

Asus was the first to introduce an SLI consumer motherboard and has been the sole maker of Athlon-based nForce4 SLI x16 mobos for the last three months. So we weren't surprised when the company produced the first mobo based on the brand-new CrossFire Xpress 3200 chipset. We had Asus' A8R32-MVP Deluxe in the Lab when other motherboard companies weren't even ready to talk about their plans. Because it uses the new CrossFire chipset, the A8R32-MVP supports dual x16 PCI-E graphics cards at full bandwidth.

On paper and in the marketing wars, the Xpress 3200 has a serious advantage over its nVidia counterpart in GPU bandwidth. While the single-chip north bridge is superior to nVidia's two-chip design, ATI still suffers in south bridge performance—not to mention its lack of SATA 3G support. ATI still hasn't fixed those problems with the 3200, so Asus ditched ATI's SB450 south bridge in favor of an ULi M1575 controller. The M1575 offers more RAID options, better performance, and SATA 3G support. The layout of the board is no-nonsense and leans more toward legacy PCI devices than PCI-E cards.

ATI has boasted about how few transistors the Xpress 3200 needs, which translates into less heat. To keep the chipset cool, all Asus needed in this board was a pair of tiny passive heatsinks.

The A8R32-MVP performed well, although we did note some speed deficiencies in several benchmarks. The real-world impact was minimal, though, and the A8R32-MVP is the mobo to buy if you're going the ATI graphics-card route.

ASUS A8R32-MVP DELUXE
$270, www.asus.com
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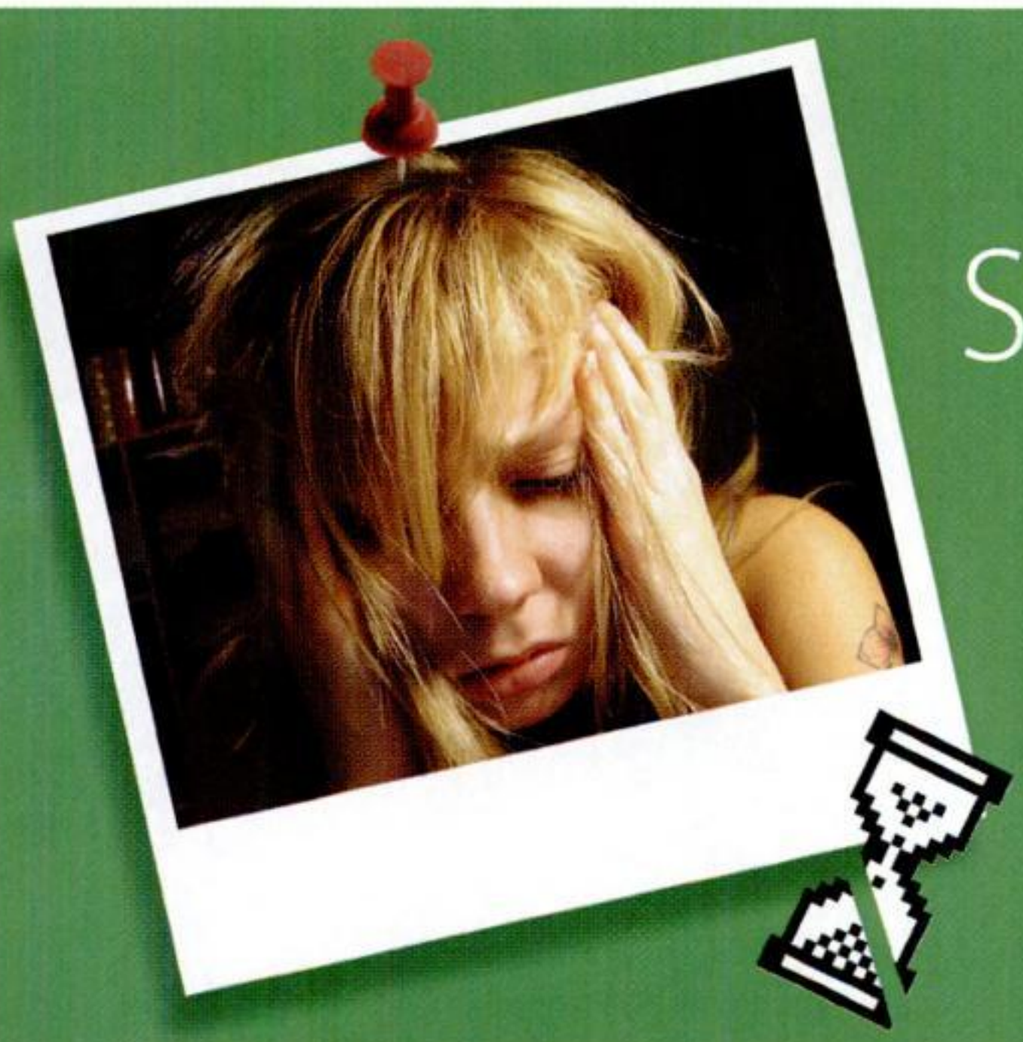

AMD

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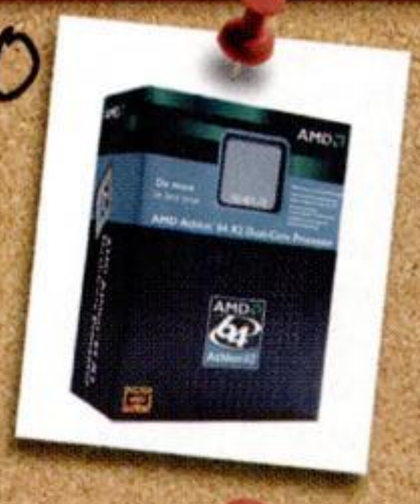
Athlon™ 64 FX-60 Processor

- Part Number: 80730
- Code Name: Toledo
- Thermal Power: 110W
- L1 Cache: 128KB x2
- L2 Cache: 1024KB x2

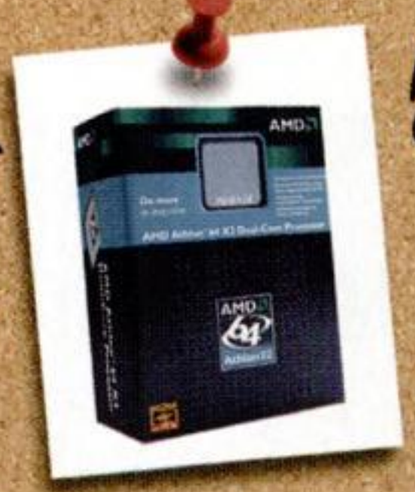


Athlon™ 64 X2 4800+* Processor

- Part Number: 80728-R
- Code Name: Manchester
- Thermal Power: 128W
- L1 Cache: 128KB
- L2 Cache: 1024KB x2

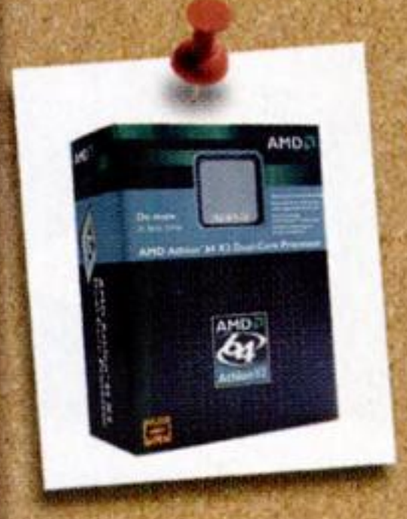
Athlon™ 64 X2 4600+* Processor

- Part Number: 80727-R
- Code Name: Manchester
- Thermal Power: 110W
- L1 Cache: 128KB
- L2 Cache: 512KB x2



Athlon™ 64 X2 4400+* Processor

- Part Number: 80726-R
- Code Name: Toledo
- Thermal Power: 110W
- L1 Cache: 128KB
- L2 Cache: 1024KB x2



Athlon™ 64 X2 4200+* Processor

- Part Number: 80725-R
- Code Name: Manchester
- Thermal Power: 89W
- L1 Cache: 128KB
- L2 Cache: 512KB x2

Athlon™ 64 X2 3800+* Processor

- Part Number: 80721-1
- Code Name: Manchester
- Thermal Power: 89W
- L1 Cache: 128KB
- L2 Cache: 512KB x2

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*This model number indicates relative software performance among this AMD processor family.

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Continued from page 26

Sapphire PURE CrossFire PC-A9RD480

Is it harder to make a motherboard than a videocard? Maybe. Motherboard makers have been successful at building and selling videocards, but no videocard maker has really succeeded at making motherboards.

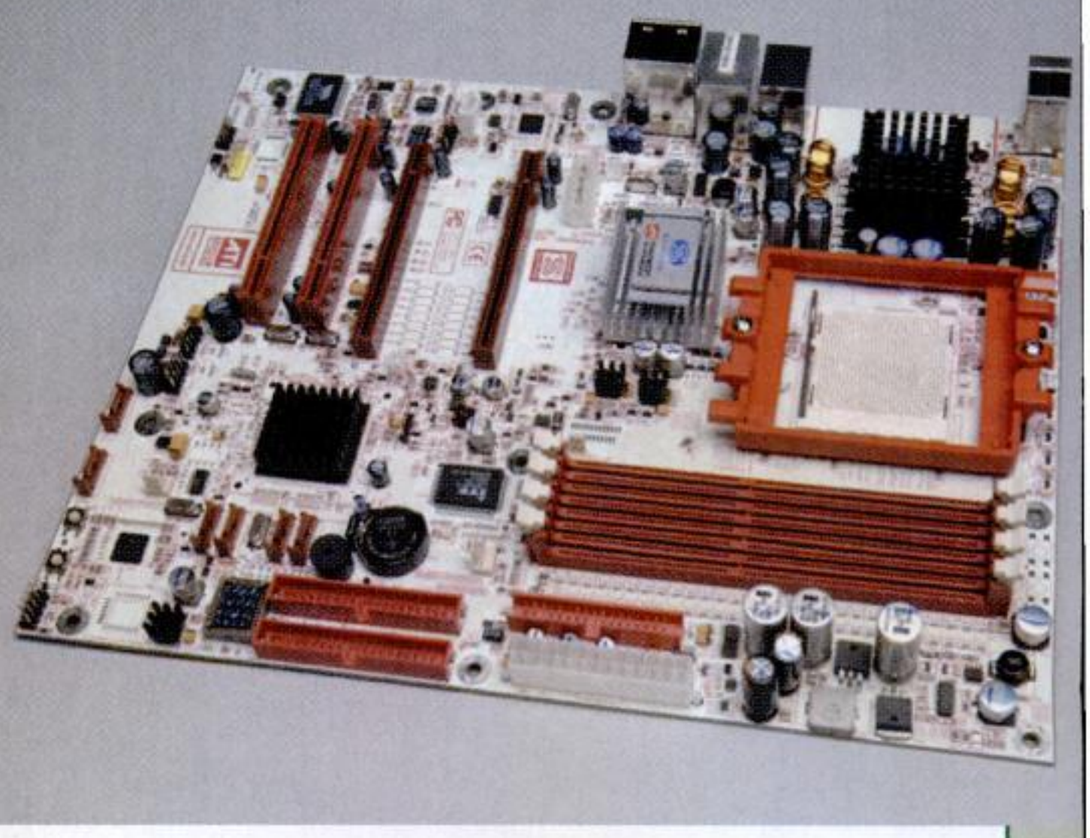
Sapphire, well known for its high-end ATI graphics cards, hopes to succeed in the mobo market with its series of Pure motherboards—all using ATI chipsets.

The PC-A9RD480 features support for CrossFire using ATI's Xpress 200 chipset, which was ATI's first try at a CrossFire chipset. Unlike the 3200 chipset, the Xpress 200 limits support to two videocards running at PCI-E x8, instead of x16. We had hoped for a Sapphire motherboard using the new Xpress 3200 chipset but a product wasn't ready by our deadline. The PC-A9RD480 gave us a pretty good idea of Sapphire's potential for motherboard design, though.

Sapphire includes several nice touches, like the onboard speaker and a surface-mounted LED to indicate hard drive activity. We also like the white PCB, which is a nice change from the standard red, black, and green board designs. The PC-A9RD480's performance was excellent.

Good performance aside, there are some serious problems with this board. First, it's a rookie mistake to place SATA ports where you can't use them when a videocard is plugged into the system. Unfortunately, that's exactly what Sapphire did with SATA ports 1 and 2. We're very concerned about Sapphire's ability to support its customers after the sale. While videocard customers rarely come back to the manufacturer once they've purchased a product, motherboard customers are always in need of a new BIOS and drivers.

Our PC-A9RD480 wouldn't ID an Athlon 64 FX-60. When we went to Sapphire's page to download a new BIOS, we found that the latest one was from November 2005 and predates the FX-60. That's a bad sign that makes us wonder just how dedicated Sapphire is to motherboards. Is the company in it for the long haul or will it cut and run like so many other videocard vendors whose attention has quickly waned?



Sapphire's CrossFire board is fast, but lackluster BIOS support and poorly placed SATA ports say "rookie builder" to us.

CROSSFIRE PC-A9RD480
$200, www.sapphiretech.com
6

CROSSFIRE CONTROVERSY

The latest version of ATI's chipset features a single-chip north bridge that gives it a performance advantage over nVidia—on paper, at least

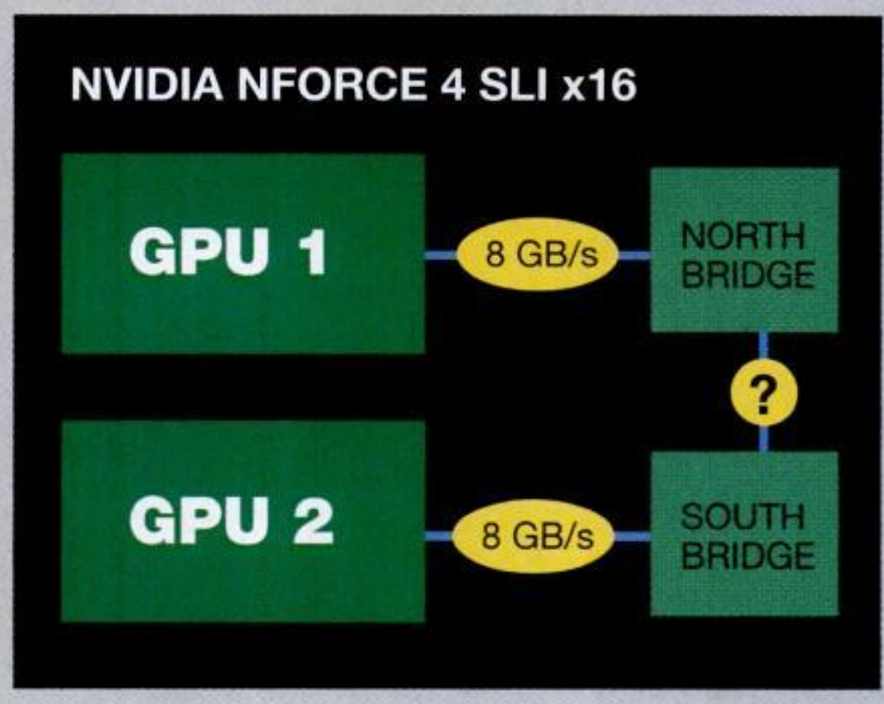
It's safe to say that ATI is back in the graphics-card game with its kick-ass CrossFire X1900 XT cards, but the company has been a little lackluster in the chipset wars.

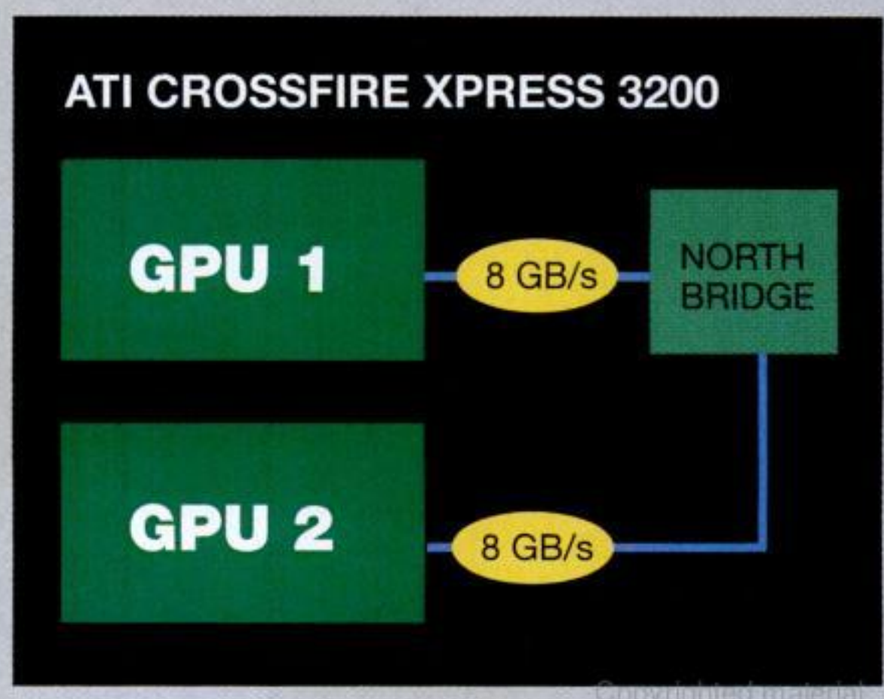
ATI's original CrossFire chipset (code-named: RD480/482) played catch-up to the original nForce4 introduced more than a year ago. Its performance could definitely have been better. ATI designed the new RD580—aka CrossFire Xpress 3200—to catapult the company ahead of nVidia's nForce4 SLI x16 chipset.

Both chipsets support two graphics cards running at x16 data rates, but only the Xpress 3200 does it with a single chip. nVidia's Achilles' heel with x16 has been its two-chip solution. Each chip supports x16 graphics cards, but what good is that if the two are connected using something slower than 8GB/s? nVidia has never coughed up the precise interconnect speed, which implies to us that it's slower than 8GB/s. ATI also likes to point out that communication between two chips that are separated by two inches of motherboard traces is beset by painful latencies that are mitigated when everything is contained in a single chip.

There's no way to measure graphics performance accurately. You can't plug a pair of CrossFire boards into an nForce4 SLI system to test the PCI Express performance, nor can you test a pair of nVidia boards in a CrossFire system. Outside of a few theoretical situations, we have yet to see dual x16 slots make a significant impact on performance. With this generation of games and graphics cards, you just don't need that kind of bandwidth. We do see an architectural advantage to a single-chip solution; in fact, nVidia has touted its own single-chip designs in the past. Who is right? Until nVidia cards work on ATI mobos and vice versa, we probably won't find out.

Continued on page 30→





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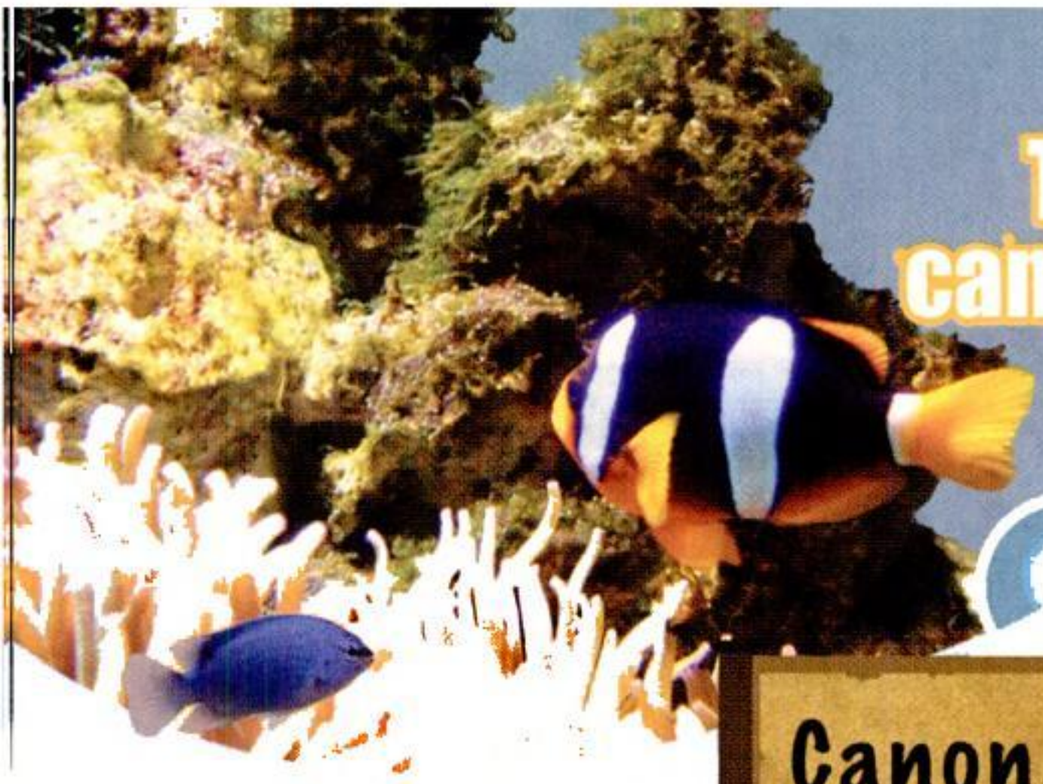

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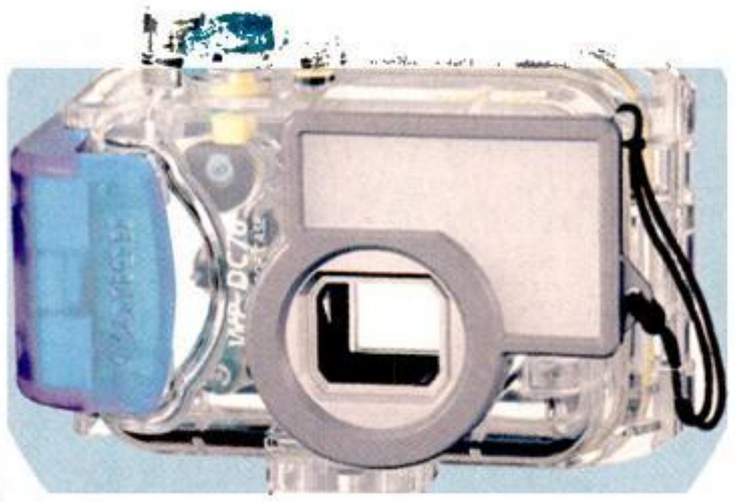

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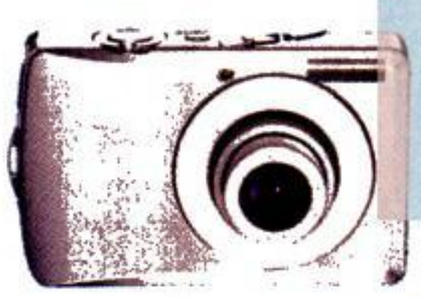

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Continued from page 28

ROAD TESTS: SILICON, MEET PCB

Performance is king, at least it used to be. Find out how these five beauties benchmarked in our real-world road test

Unlike previous motherboard showdowns, where we saw significant variance in performance across boards, most of the motherboards we tested this go-round performed well.

To test motherboards, we specifically pick benchmarks that we know to stress the chipset and CPU rather than the videocard. We run games at low resolutions, to ensure they'll be bottlenecked by the CPU and chipset performance, rather than the memory. Unfortunately, it's impossible to verify the many claims ATI and nVidia make about multi-GPU performance of their respective chipsets, as we can't compare the platforms using the same pair of videocards.

On the Athlon 64 front, the Sapphire board actually performed very well in most tests, but its score suffered because the design blocks access to the SATA ports and the BIOS hasn't been updated to support newer CPUs. So it's really a toss-up between MSI's nForce board and Asus' CrossFire-based implementation. We're leaning toward MSI, thanks to a slight performance edge, upgrade software, and the hardware audio support. Of course, if you're planning to run a dual-GPU rig, you don't have a choice either way—you've got to go with MSI for an nVidia system and Asus for an ATI rig.

In Intel land, we found the two 975X boards to be closely matched in performance. So, again, it comes down to features. We'll take the subdued P5WD2-E Premium over the noisy Gigabyte. We applaud Gigabyte's effort to help out water-cooling folk, but the "turbo" fans are just too noisy for our tastes. MPC

RESULTS: THE INTEL EDITION

	P5WD2-E	GIGABYTE GA-G1975X
3DMARK2001SE	**26,076**	25,787
3DMARK03	16,983	**17,017**
3DMARK05	7,694	**7,712**
3DMARK06	**4,400**	4,385
PCMARK05	**6,635**	6,547
PCMARK HDD	**6,577**	6,547
QUAKE III (FPS)	418	**440**
DOOM 3 (FPS)	**106**	90
FEAR (FPS)	**155**	150
AQUAMARK3D	**93,699**	79,496
SANDRA RAM (MB/S)	**6,607**	6,270

Best scores are bolded. We used a dual-core Intel 3.46GHz Pentium Extreme Edition 955, 1GB of Crucial Ballistix DDR2/667 RAM, a GeForce 7800 GTX, a Western Digital WD740 Raptor, and Windows XP Pro to test the two Intel motherboards.

RESULTS: THE AMD EDITION

	MSI K8N DIAMOND PLUS	ASUS A8R32-MVP DELUXE	SAPPHIRE PC-A9RD480
3DMARK2001SE	28,907	30,058	**31,017**
3DMARK03	16,892	16,762	**16,906**
3DMARK05	**7,874**	7,871	7,843
3DMARK06	4,408	**4,409**	4,391
PCMARK05	6,467	**6,470**	6,451
PCMARK HDD	6,906	**6,920**	6,416
QUAKE III	487	460	**495**
DOOM 3	122	112	**127**
FEAR	192	194	**210**
AQUAMARK3D	96,903	94,040	**98,484**
SANDRA RAM	**5,910**	4,827	5,840

Best scores are bolded. For the AMD boards, we tested using a dual-core 2.6GHz Athlon 64 FX-60 CPU, 1GB of Corsair XMS Xpert DDR400 RAM, a GeForce 7800 GTX, a Western Digital WD740 Raptor, and Windows XP Pro to test the three Athlon 64 motherboards.

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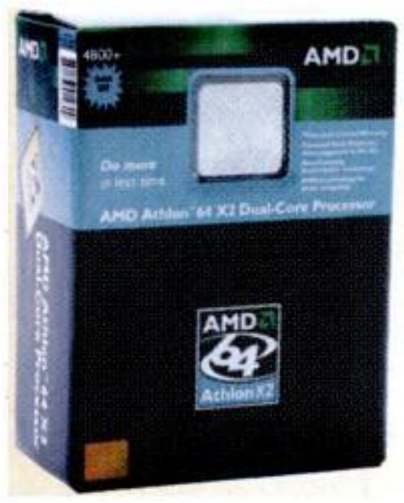

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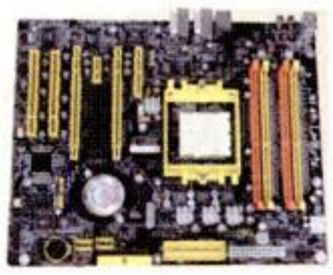

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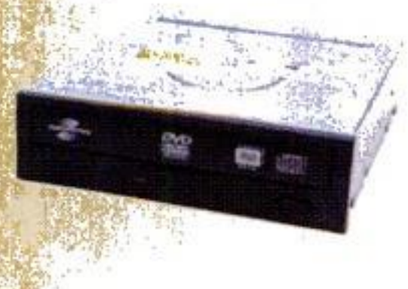

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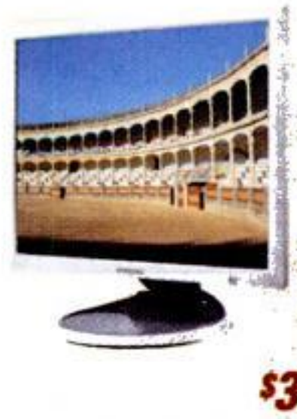

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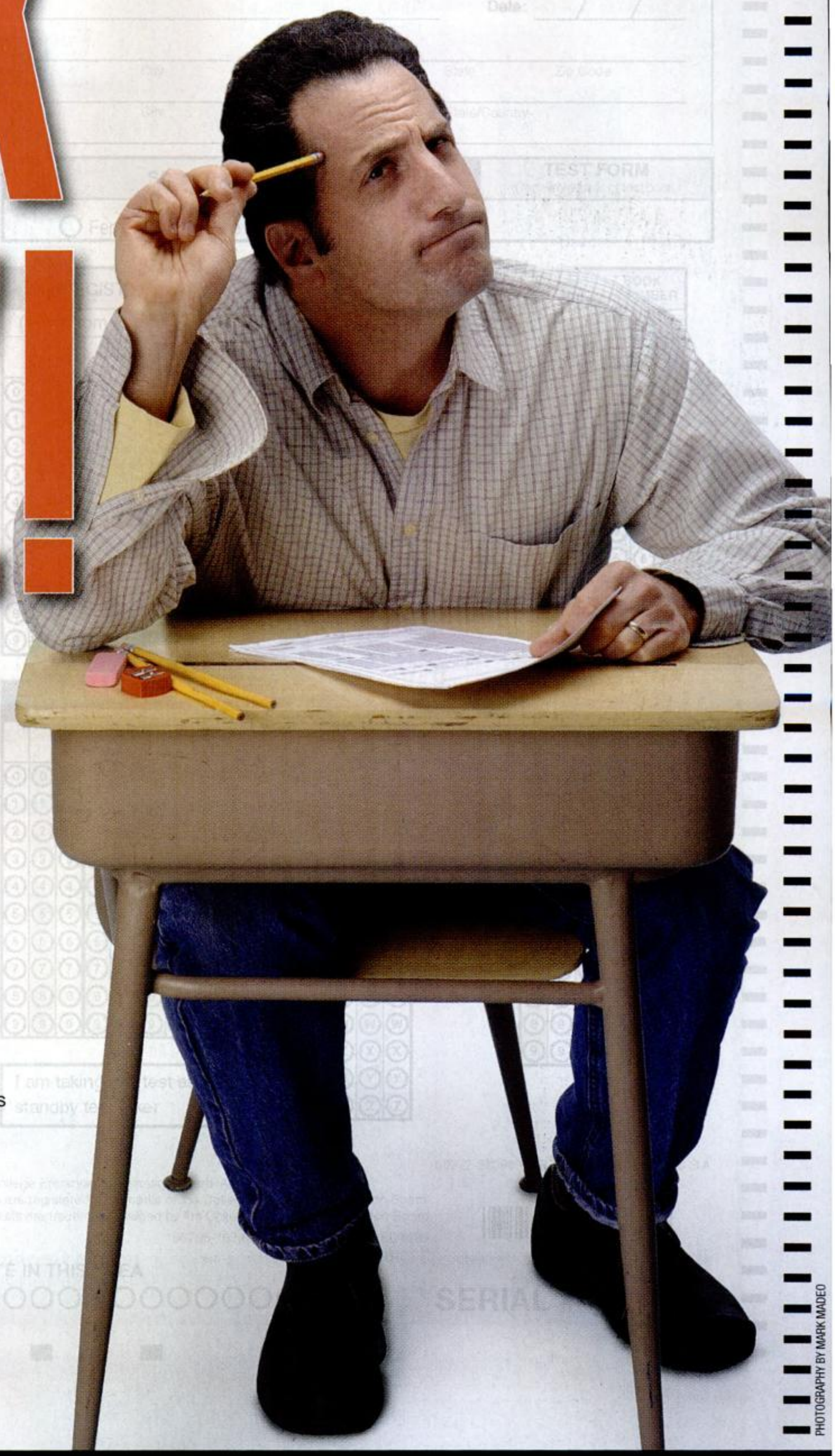
Maximum PC's 6th Annual

GEEK QUIZ!

So you think you know a lot about computing?

Month in and month out, we poke and prod, test and torture all manner of PC products, in an attempt to quantify their worthiness. This month, dear readers, it's your turn to be evaluated. We're putting your computing knowledge to the test with 45 of the most grueling quiz questions to ever grace the pages of this magazine. Find out where you land on the Maximum PC Geek Verdict-O-Meter, and see if you're even close to deserving a Kick Ass award. Answers are on page 36—but remember, cheaters never prosper!



PHOTOGRAPHY BY MARK MADEO

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THE WARM-UP

1) Which of these companies offers dual-GPU videocard technology?
Ⓐ ATI
Ⓑ nVidia
Ⓒ S3
Ⓓ All of the above

2) Which of these acronyms does not represent a data-encryption standard?
Ⓐ PGP
Ⓑ LPG
Ⓒ DES
Ⓓ WEP

3) Monitors sold today might be unusable in the near future because they lack support for:
Ⓐ HD resolutions
Ⓑ Dual Link DVI
Ⓒ HDCP
Ⓓ All of the above

4) Head-related transfer functions (HRTFs) are used in:
Ⓐ Virtual surround-sound systems
Ⓑ Psychotherapy sessions
Ⓒ The Yamaha YSP-800
Ⓓ World Cup Soccer

5) Biometric security systems have been spoofed by:
Ⓐ Amputated fingers
Ⓑ Fake fingers made of Play-Doh
Ⓒ Glass eyes
Ⓓ All of the above

6) SATA 150 drives will always be slower than SATA 3G drives:
Ⓐ True
Ⓑ False

7) Burn-in is to a CRT as ___ is to an LCD:
Ⓐ Ghosting
Ⓑ A stuck pixel
Ⓒ Image persistence
Ⓓ Static electricity

8) Which of the following programs tests a monitor's image quality?
Ⓐ PureVideo
Ⓑ 3DMark06
Ⓒ Avivo
Ⓓ DisplayMate

9) U3 is:
Ⓐ The name of a common framework for software applications that launch from a USB memory device instead of from the host PC
Ⓑ The name of the fan club for the Irish rock band U2
Ⓒ The code-name for ATI's triple-GPU R&D effort, abandoned soon after nVidia announced Quad-SLI
Ⓓ The successor to the U2 spy plane

10) The most commonly used image sensor in digital cameras is the CCD, which stands for:
Ⓐ Circuit Charge Device
Ⓑ Coupled Charge Device
Ⓒ Charge Circuit Device
Ⓓ Charge Coupled Device

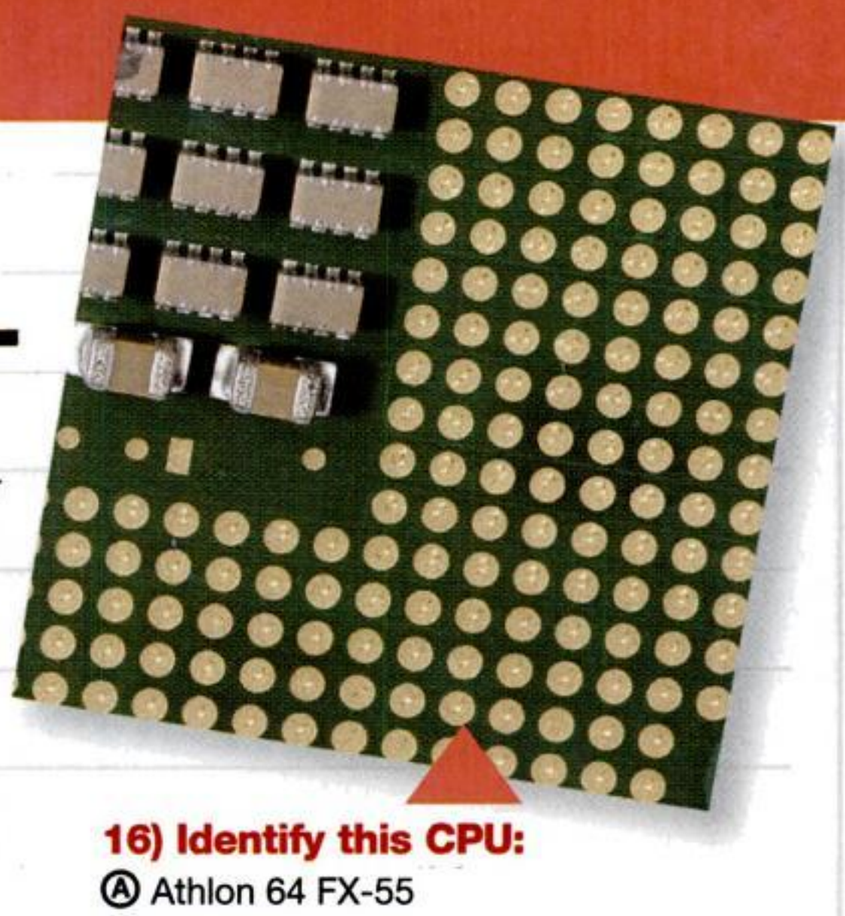
11) What does Microsoft plan to name its OS following Vista?
Ⓐ Everest
Ⓑ Vesuvius
Ⓒ Vienna
Ⓓ Bratwurst

12) Which audio device supports hardware audio acceleration?
Ⓐ nForce 4 Ultra MCP
Ⓑ Creative Labs Audigy 2 ZS
Ⓒ Philips Ultimate Edge
Ⓓ M-Audio Revolution 7.1

13) Currently, ultra-high LCD resolutions require:
Ⓐ EDID 2.0 support
Ⓑ Dual Link DVI
Ⓒ DFP support
Ⓓ SLI/CrossFire

14) Which technology development threatens the BTX formfactor?
Ⓐ Dual-videocard implementations
Ⓑ Low-wattage CPUs
Ⓒ Dual-core CPUs
Ⓓ The small formfactor craze

15) The more technical term for "jaggies"—the visible "steps" of diagonal lines in a digital image—is:
Ⓐ Alignment
Ⓑ Jiggies
Ⓒ Aliasing
Ⓓ Edge-contrast



16) Identify this CPU:
Ⓐ Athlon 64 FX-55
Ⓑ Pentium M
Ⓒ Pentium Extreme Edition 955
Ⓓ Athlon XP 3200+

17) The high-end, 3D interface in Windows Vista is called:
Ⓐ Aurora 3D
Ⓑ Aurora Glass
Ⓒ Aero Glass
Ⓓ Aero Ice

18) Perpendicular recording technology is used in what type of storage?
Ⓐ Hard drives
Ⓑ Optical storage
Ⓒ RAM
Ⓓ Flash memory

WE'RE JUST GETTING STARTED

19) What's the percentage of American parents who play computer games, according to a recent study published by the Entertainment Software Association?
Ⓐ 12 percent
Ⓑ 23 percent
Ⓒ 34 percent
Ⓓ 43 percent

20) SATA II refers to:
Ⓐ A set of features included in the SATA specification
Ⓑ The group charged with authoring SATA specifications
Ⓒ It's the equivalent of SATA 3G
Ⓓ The second iteration of the SATA spec

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GEEK QUIZ!

21) What type of memory is this? A single stick of:
Ⓐ DDR
Ⓑ DDR2
Ⓒ GDDR3
Ⓓ RAMBUS

22) RD580 is code-name for ATI's:
Ⓐ All in Wonder videocard
Ⓑ X1900 XT gaming GPU
Ⓒ CrossFire Xpress 3200 north bridge
Ⓓ FireGL 3D workstation GPU

23) Which of these audio codecs is not lossless:
Ⓐ FLAC
Ⓑ ATRAC
Ⓒ OGG
Ⓓ WMAL

24) PCI-X is:
Ⓐ The nickname for PCI Express
Ⓑ A higher-bandwidth version of PCI Express
Ⓒ An extension to PCI that's used mostly in workstations
Ⓓ The name of the X-Men's stealth plane

25) What game used to allow the activity "dolphin diving"?
Ⓐ Far Cry
Ⓑ Silent Hunter III
Ⓒ Battlefield 2
Ⓓ World of Warcraft

26) Creative Labs did not purchase:
Ⓐ Aureal
Ⓑ QSound Labs
Ⓒ Sensaura
Ⓓ 3DLabs

27) The native file format for video on an iPod is:
Ⓐ MP3
Ⓑ Divx
Ⓒ MPEG-4
Ⓓ AVI

28) What chipset does not support encoding to Dolby Digital in real time?
Ⓐ Intel 910
Ⓑ nVidia nForce2
Ⓒ Intel 975X
Ⓓ nVidia nForce4 Ultra

29) Which of the following is not a real socket?
Ⓐ Socket M3
Ⓑ Socket 940
Ⓒ Socket A
Ⓓ Socket 604

30) Which of the following is responsible for motion artifacts on an LCD monitor?
Ⓐ Analog interface
Ⓑ Non-native resolution
Ⓒ Pixel response time
Ⓓ Magnetic interference

OK, BUB, LET'S SEE WHAT YOU'RE REALLY MADE OF

31) Which of the following materials is not used in semiconductor manufacturing?
Ⓐ Xylene
Ⓑ Aqua Regia
Ⓒ Silicon Trioxide
Ⓓ Hydrofluoric Acid

32) The acronym used to describe the material that transfers heat from a CPU into a cooling mechanism is:
Ⓐ TIM
Ⓑ AS5
Ⓒ OMG
Ⓓ WTF

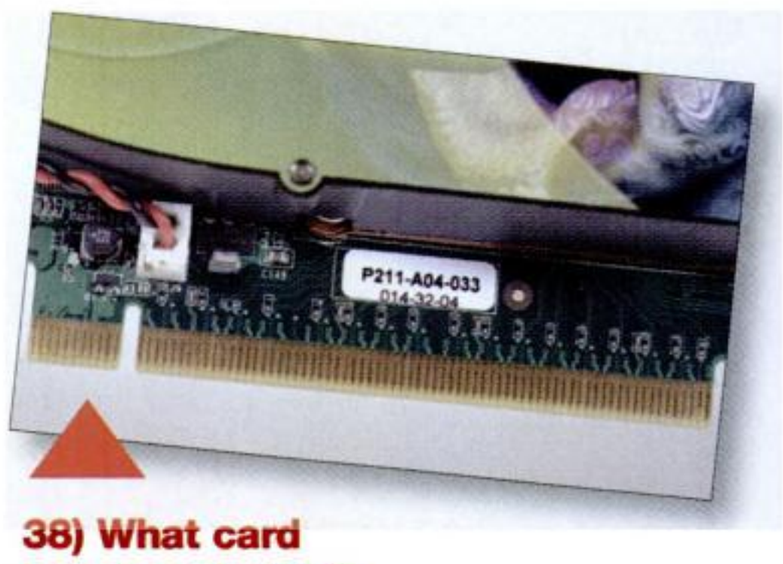
33) A letterboxed image with an aspect ratio of 16:9 displayed on a 1280x1024 screen would measure:
Ⓐ 960x720 pixels
Ⓑ 1280x960 pixels
Ⓒ 1280x720 pixels
Ⓓ 1440x900 pixels

34) Which processor code-name does not belong in this list?
Ⓐ Presler
Ⓑ Mustang
Ⓒ Timna
Ⓓ Yonah

35) Which processor has the highest transistor count?
Ⓐ 3.40GHz Pentium 4 Extreme Edition
Ⓑ 3.46GHz Pentium Extreme Edition 955
Ⓒ 900MHz Intel Itanium 2
Ⓓ 2GHz Athlon 64 FX-60

36) SLI is an acronym for:
Ⓐ Scan-line Interweave, a dual-GPU technology from 3dfx
Ⓑ SAP Labs India, a subsidiary of SAP, the world's fourth-largest software company
Ⓒ Scalable Link Interlock, a dual-GPU technology from nVidia
Ⓓ Sequentially Locking Isotopes, a set of atoms whose nuclei have the same number of protons, but different number of neutrons

37) Some water-cooling kits use a process called jet impingement. Which part of the kit uses it?
Ⓐ CPU water block
Ⓑ Radiator
Ⓒ Water pump
Ⓓ Reservoir



38) What card interface is this?
Ⓐ PCI Express x8
Ⓑ PCI-X
Ⓒ AGP
Ⓓ PCI

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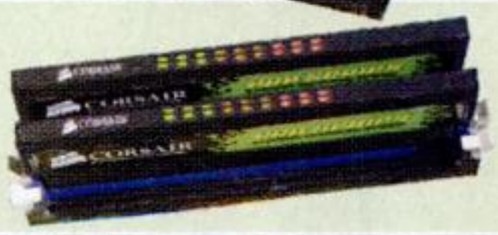

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GEEK QUIZ!

39) What processor does not contain 64-bit OS support?
Ⓐ Socket 754 Sempron
Ⓑ Opteron
Ⓒ Athlon 4
Ⓓ Pentium D

40) Which processor does not feature an on-die memory controller?
Ⓐ Timna
Ⓑ Crusoe
Ⓒ Barton
Ⓓ Toledo

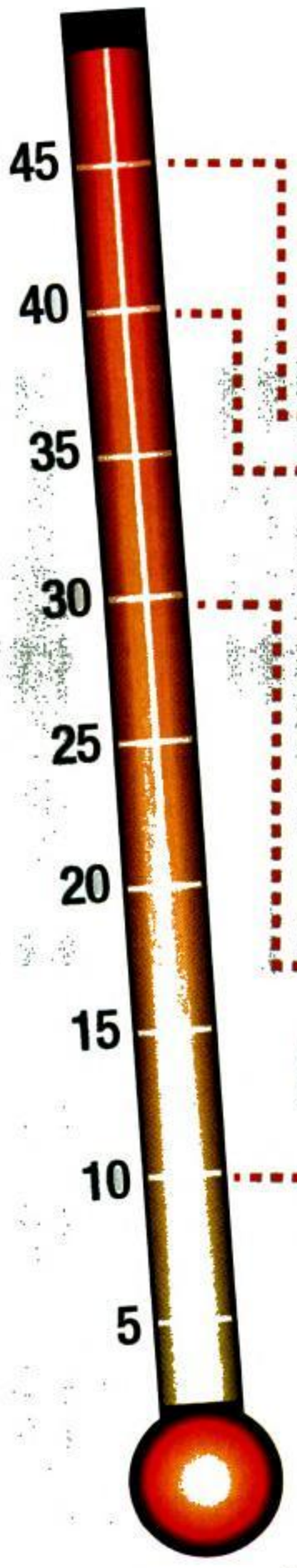
41) A 3088x2056 digital picture would have a megapixel rating of:
Ⓐ 3.3
Ⓑ 4.1
Ⓒ 6.3
Ⓓ 7.0

42) Native Command Queuing, as implemented in the SATA specification, has a queue depth of how many requests?
Ⓐ 16
Ⓑ 32
Ⓒ 48
Ⓓ 64

43) Bob has two computers connected using a slow, long range Wi-Fi link that gives him 40Kb/s of bandwidth between his work and home computers. Bob also has a 40GB pocket hard drive, and carries large files between the two machines on it, forming an old-fashioned SneakerNet. Bob's walking speed is 5mph, his office is 2.5 miles from his home. How big must a file be before it's faster for Bob to carry the bits himself, rather than send them over the Wi-Fi link?
Ⓐ 90MB
Ⓑ 9MB
Ⓒ 2MB
Ⓓ 50MB

44) What is the upstream bandwidth of an AGP 8x graphics card?
Ⓐ 2GB/s
Ⓑ 1.06GB/s
Ⓒ 266MB/s
Ⓓ 533MB/s

45) In 1994, _____ sold the first consumer digital cameras.
Ⓐ Apple
Ⓑ Ricoh
Ⓒ Kodak
Ⓓ Canon



Where Do YOU Rate on the Verdict-O-Meter?

What fun is a test without grades? Check the answers at the bottom of this page, and find out where you fall on the Maximum PC verdict scale

10 — 41-45 CORRECT ANSWERS

You are the pinnacle of *Maximum PC* excellence. You outperform all others in your class, and you offer groundbreaking new features and unprecedented attention to detail. You are a Kick Ass reader, through and through. Well done!

YOU SHARE THE UPPER ECHELONS WITH:
- HALF-LIFE 2
- THE WESTERN DIGITAL RAPTOR
- THE ATI RADEON 9700

9 — 31-40 CORRECT ANSWERS

You're an excellent product, with just a minor blemish or two. If you managed to score more than 38 correct, you can award yourself an honorary Kick Ass award! Congratulations on being among the best in your class!

YOU'RE AMONG THE RANKS OF:
- PSYCHONAUTS
- THE SAMSUNG 940BF
- THE NVIDIA GEFORCE 6800 GS

7 — 11-30 CORRECT ANSWERS

Not bad, but there's definitely room for improvement. A 7 verdict tells us we should carefully weigh the costs and benefits of *you*! We characterize items in this category as possessing a frustrating mix of good and bad qualities—you might look great, but smell bad, for instance.

YOUR SOUL MATES ARE:
- STUBBS THE ZOMBIE
- THE ANTEC P180
- THE EMAGIN Z800 3D GOGGLES

3 — 0-10 CORRECT ANSWERS

It's much more difficult to hand out a negative verdict than a good one. A verdict of 3 denotes a product that generally sucks, but which might have *some* use to *some* person, *somewhere* on the planet (your spouse, perhaps?).

YOU KEEP COMPANY WITH:
- THE MATRIX: PATH OF NEO
- THE GIZMONDO
- THE MICROSOFT STARK MOUSE

ANSWERS

1-D, 2-B, 3-C, 4-A, 5-D, 6-B, 7-C, 8-D, 9-A, 10-D, 11-C, 12-B, 13-B, 14-B, 15-C, 16-C, 17-C, 18-A, 19-C, 20-B, 21-B, 22-C, 23-B, 24-C, 25-C, 26-B, 27-C, 28-D, 29-A, 30-C, 31-C, 32-A, 33-C, 34-B, 35-B, 36-B, 37-A, 38-A, 39-C, 40-C, 41-C, 42-B, 43-B, 44-C, 45-A

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FASTEST BOOT IN THE WEST!

We shaved 31 seconds from our boot time! Here's how

By Josh Norem

Running Windows XP on a super-tuned, hot-rod PC is like putting snow tires on a Ferrari Enzo. Talk about a performance bottleneck. A fresh install of XP boots like greased lightning, but six months later, your peppy computer has become a *poopy* PC that takes ages to boot.

To get the most boot-time benefit, we took a 22-month old installation of Windows, made an image, then ran through every boot-time-reducing tweak we could find.

We're going to walk you through each tweak one-by-one, showing you the hard benefit we gained from each one. While your savings may vary, anyone who follows these steps will have a faster-booting PC, guaranteed.

FOREGROUND PHOTOGRAPHY BY MARK MADEO

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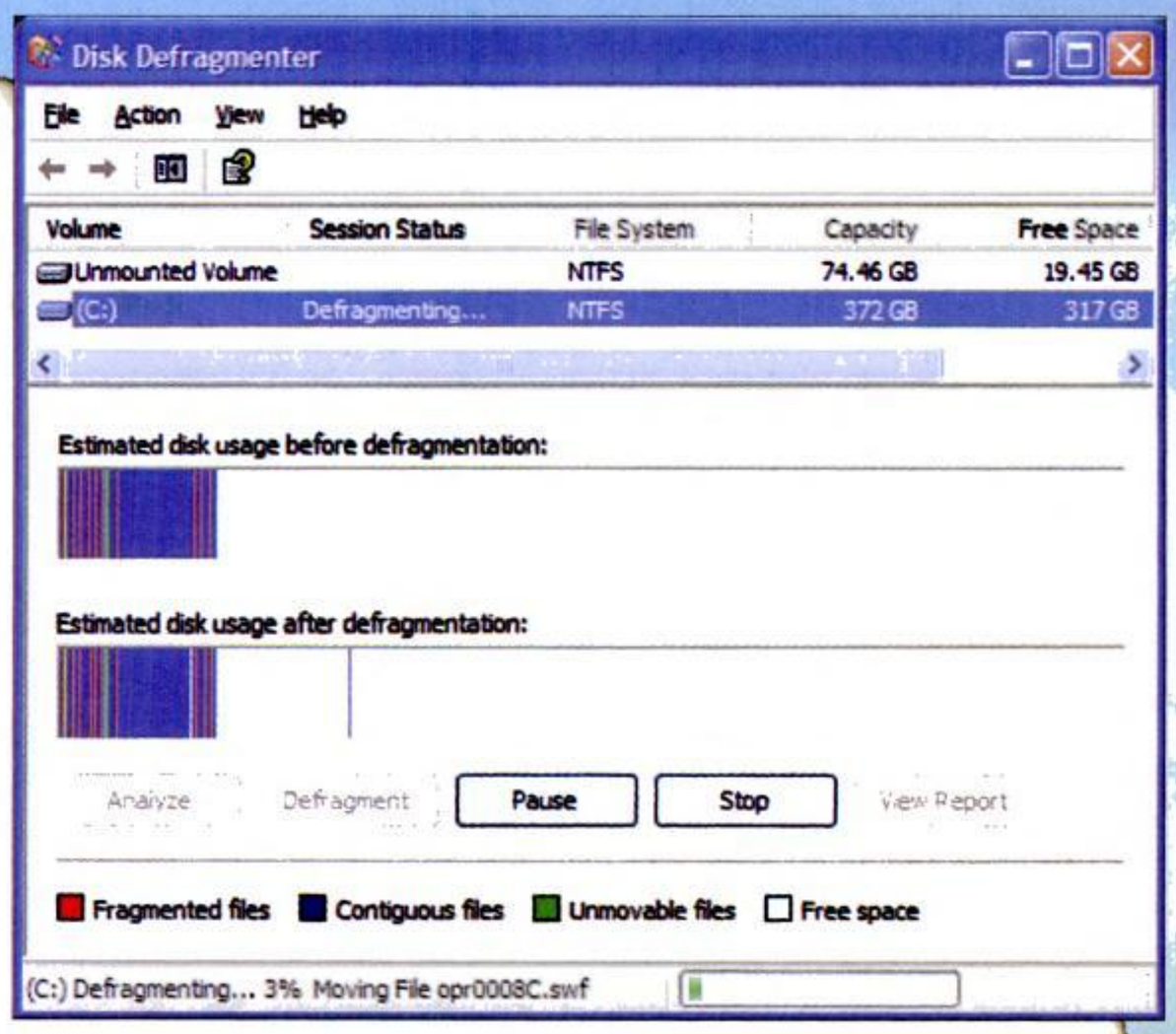
FIRST, TAKE A MOMENT TO DEFRAG

TIME SAVED 0 SEC

You've heard it a million times, but we're going to say it once again—defrag your hard drive. The easiest way to improve performance in any type of disk-intensive operation, including booting, is to make sure the drive is defragged. Every clean install of Windows starts fragmented, and gets worse from there. When a drive is fragmented, chunks of each file are scattered all over the drive. In order to read them, the hard drive's read/write head has to jump all over the platters, which takes time. By placing as many bits as possible in sequential order on the platters, defragging allows your drive to transfer data at a much higher rate. The hard drive in our test system was in very good shape thanks to regular defrags, so this step didn't save us any time on boot. Regardless, it's just good housekeeping, so do it. DO IT NOW.



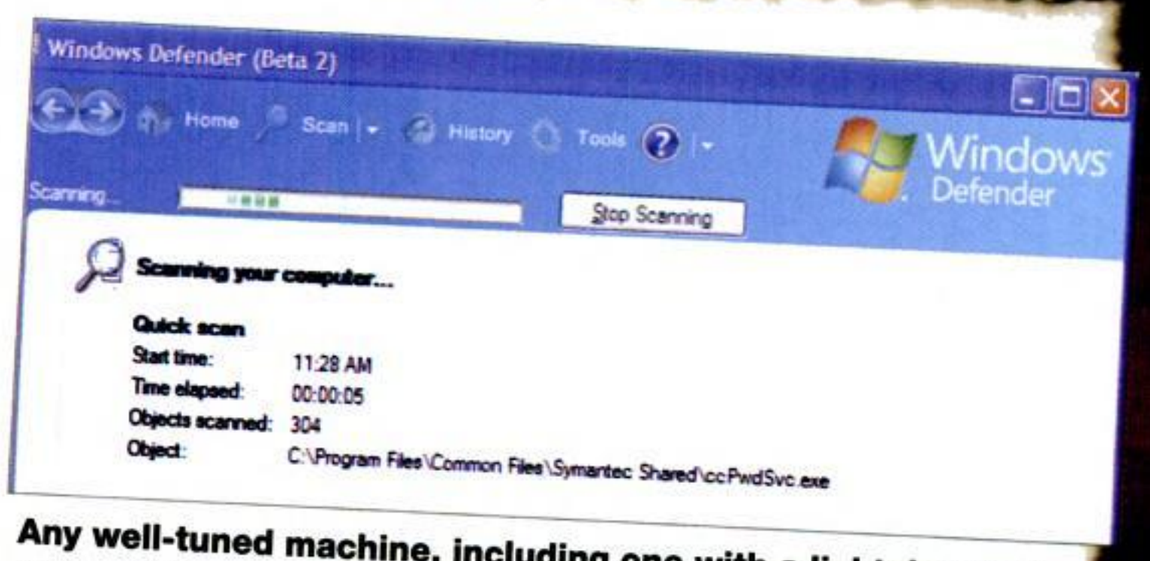
Looks like our hard drive house is in decent order. Yours might not be, so be sure to defrag before you do anything else.

MORE GOOD HOUSEKEEPING

TIME SAVED 0 SEC

This tip is about as sexy as John Goodman, but it has to be said: Before you even begin to tweak your PC's boot time, you have to make sure your computer is free of spyware, adware, and viruses. An infection by any one of these vile pieces of code can slow down your boot time more than you can imagine.

As we've said in the past, in order to combat today's multitude of threats, you've got to use a multi-pronged approach, including at least two anti-spyware apps and a good antivirus program. On our test machine, we're running *Windows Defender, Norton AntiVirus, and Spybot Search and Destroy.* We also type wearing rubber gloves, don a hazmat suit at our desk, and never ever open email attachments. You might not want to employ this level of protection, but for the love of your computer, protect yourself and your PC at all times.



Any well-tuned machine, including one with a lightning-fast boot, will be free of spyware and viruses. We've been using *Windows Defender Beta 2,* along with *Norton AntiVirus* and a few other utilities, to fend off malicious code.

CLEAN YOUR STARTUP FOLDER

TIME SAVED 3 SEC

Now it's time to take a look at the Startup folder. While there are usually a few useful apps in there—think instant-messaging—it's full of benign but unneeded mini-applications that are part of larger programs. For example, installing Adobe *Photoshop* will install an app in this folder named Adobe *Gamma Loader.* Delete what you don't want from the Startup folder—and believe us, you can delete everything. There are no system-critical files here, so nuke and pave.

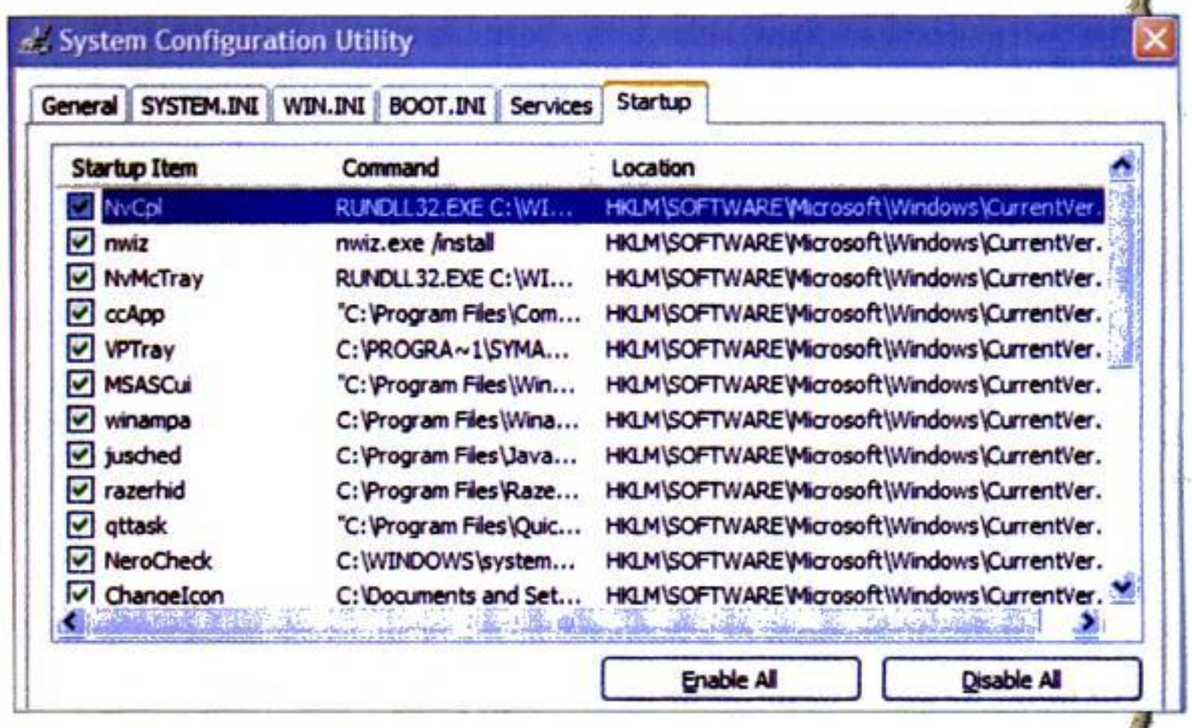
On our test machine, we had only one unexpected program in our Startup folder. Nearly any shortcut in this folder can be deleted with no ill side-effects.

CLEAN THE REST OF THE STARTUP FOLDERS

TIME SAVED 16 SEC

The files you just deleted from the Startup folder were decoys. There are several other top-secret, G3-clearance nooks of Windows that have the power to automatically start apps when Windows loads. To find these hidden spots, you'll want to use a tool called msconfig. (To start the app, click your Start Menu then Run and type `msconfig` in the bar.) Once you've started msconfig, you'll want to click on the Startup tab.

Every item in this tab runs *every* time you boot your PC, so cleansing this list can shave your boot time more than the rest of the tips combined, especially on systems with tons of applications installed. *NeroCheck*? Buh-bye. *iTunes Helper?* See ya. Anything having to do with your display, antivirus, or spyware utilities can stay. If you don't know what something is or what it does, it's better to err on the side of caution and leave it be. If you're pretty sure it's junk, delete it. We deleted 13 entries from this list for a grand total of 16 seconds saved.



You probably didn't realize the number of unwanted apps that hitch a ride on your PC's boot process. Kick them to the curb using msconfig.

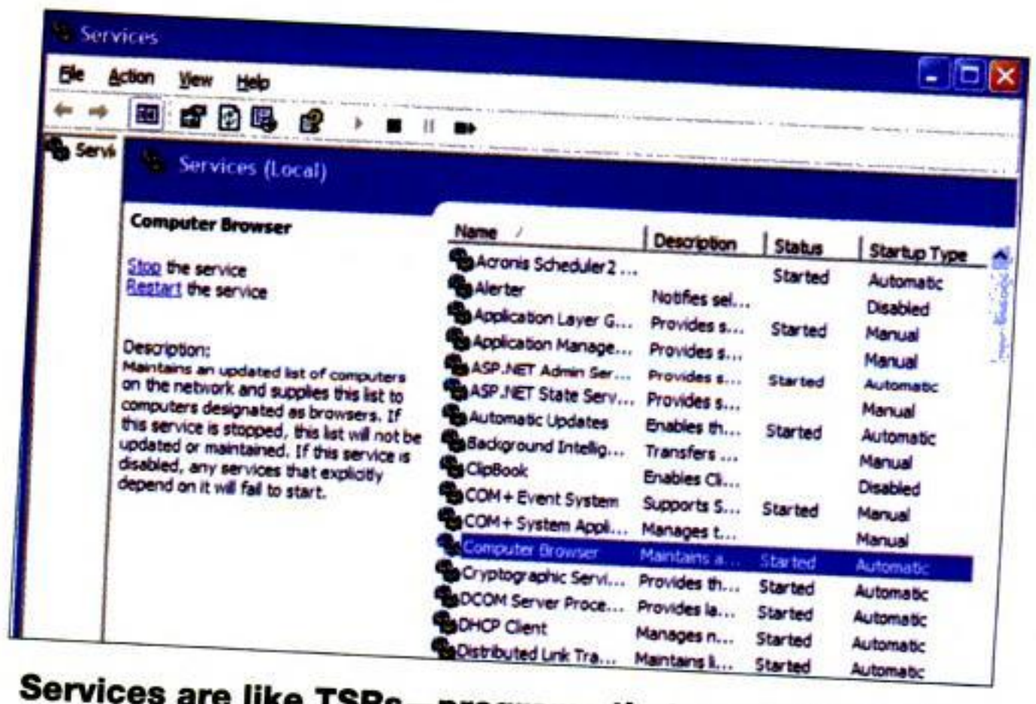
DON'T SETTLE FOR BAD SERVICE

TIME SAVED 9 SEC

The bastard son of msconfig's Startup tab is msconfig's Services section. Running unnecessary services every time you start your PC slows your boot time and wastes resources.

As you can see, there are dozens of services running on your computer, which makes it difficult to determine what's safe to disable. The easiest way to navigate the list is to check the box that says "Hide all Microsoft Services." Uncheck any obvious garbage you see (such as Microsoft Office Engine, CD burning apps, *QuickTime*, etc.), and then click OK. If there are some suspicious services installed, but you're unsure whether you can disable them, click the Start Menu, then Run, and type "services.msc" to open the services control panel. The services panel gives you much more detail about each service, so you can decide whether you want to disable something or leave it running.

To permanently disable a service, right-click it and select Properties. In the Properties menu, you can toggle its Startup value from Automatic to Manual. We removed seven items from our list, which saved seven seconds. We removed Ipodservice, Acronis Scheduler, Office Engine, Symantec Event Manager, and a few others. If you're using a home computer that is not connected to a network, you can disable the Workstation service as well. The Workstation service alone saved us two seconds.



Services are like TSRs—programs that start automatically when Windows boots. Though many are required by Windows, some are totally useless. Jettison them now.

Boot-Time Snake Oil

In our testing, we tried many tips that didn't improve our boot performance at all, made our PC boot slower, or worst of all, actually prevented our PC from booting. Here are a few "tips" you should avoid.

FONT DELETION: We tried deleting a bundle of unused fonts (at least the ones we thought were unused). It seemed like a good idea, since Windows has to load the fonts every time your PC boots. We deleted 94 fonts, but saw no benefit at all.

TWEAKING BOOT.INI: We also made some changes to the boot.ini file, which controls how the bootloader actually starts Windows. Unfortunately, our tweaks made our PC stop booting entirely. Beware.

DELETING TEMP FILES: Deleting your temp files is a good idea, for general tidiness' sake, but it doesn't help improve your boot time. The same goes for deleting "history" files, cache, and cookies.

TURNING OFF STARTUP SOUNDS: We don't like the Microsoft jingle anyway, but just for kicks we enabled and then disabled the startup sound, and it made zero difference in our boot time.

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BOOT-SPEED BIOS TWEAKS

TIME SAVED 2 SEC

The last of the relatively simple tweaks will require you to enter your system's BIOS. To get into the BIOS, you need to press F2 or Delete as soon as you turn on your PC.

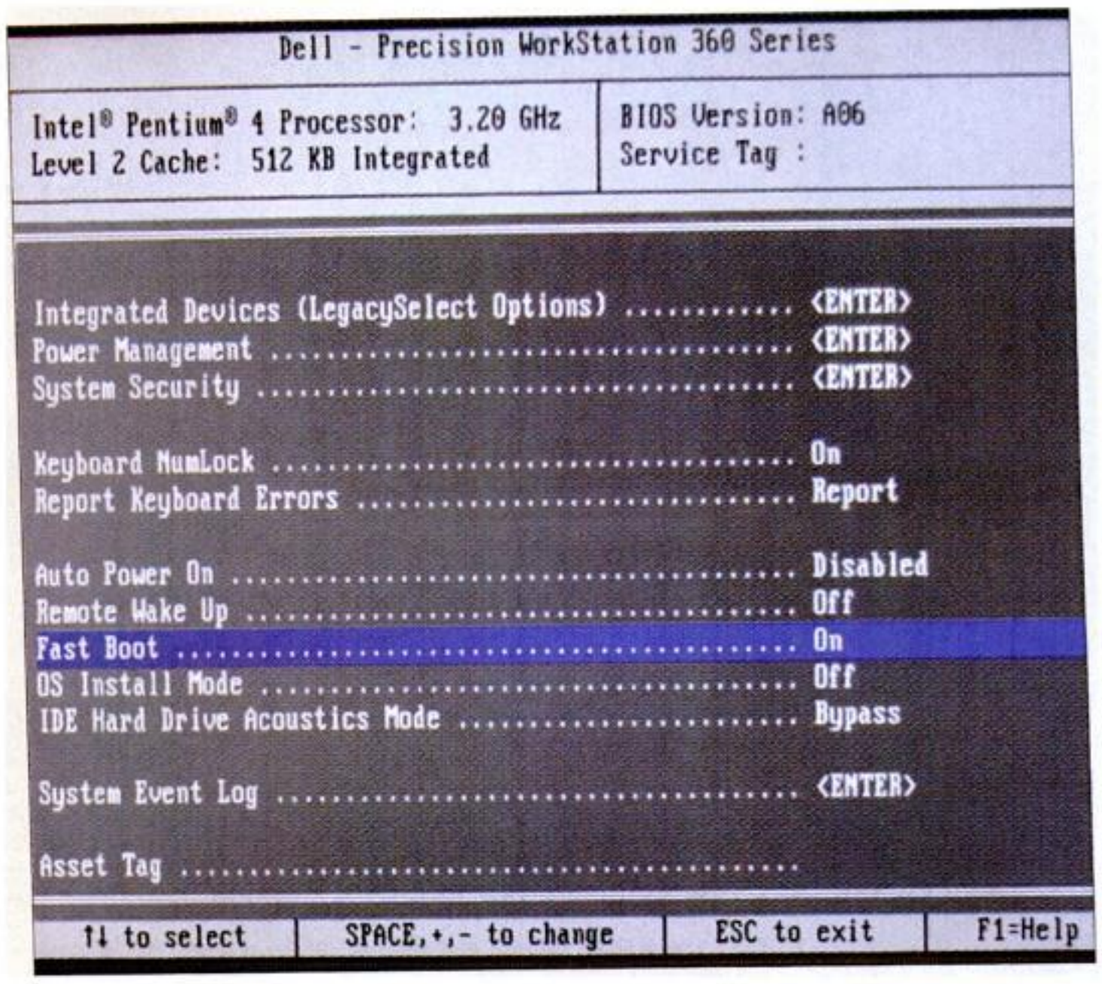
First, disable any unused hard drive or RAID controllers that are integrated on your mobo. You can usually find the controls for this hardware on the Integrated Peripherals or Chipset page. By disabling these controllers, you avoid a delay of up to 10 seconds, while the disk controller looks for devices that aren't there.

We also recommend disabling the floppy controller (if you don't have a floppy) and removing any extraneous boot devices from the boot sequence. For maximum boot speed, your hard drive should be the very first boot device.

You should also make absolutely certain you enable the Fast Boot option. Fast Boot lets your BIOS skip time-consuming tests—such as a full memory scan—to increase boot speed. Fast Boot is usually in the Advanced Chipset Features menu.

When you're looking at the settings for your hard drive controller, pay attention to the Hard Disk Pre-Delay. This setting essentially puts the boot process on hold to give your hard drives a moment or two to spin up. Set this to the lowest setting that still lets the BIOS detect your hard drives.

Finally, disable any unused I/O devices, such as COM and parallel ports, then reboot back to Windows.


Dell - Precision WorkStation 360 Series
Intel® Pentium® 4 Processor: 3.20 GHz
Level 2 Cache: 512 KB Integrated
BIOS Version: A06
Service Tag :
Integrated Devices (LegacySelect Options) ..... <ENTER>
Power Management ..... <ENTER>
System Security ..... <ENTER>
Keyboard NumLock ..... On
Report Keyboard Errors ..... Report
Auto Power On ..... Disabled
Remote Wake Up ..... Off
Fast Boot ..... On
OS Install Mode ..... Off
IDE Hard Drive Acoustics Mode ..... Bypass
System Event Log ..... <ENTER>
Asset Tag .....
↑↓ to select
SPACE,+,- to change
ESC to exit
F1=Help

This Dell BIOS is rather limited in terms of options—just the way IT workers like it—but enthusiast boards usually have plenty of options that most users can shut off.

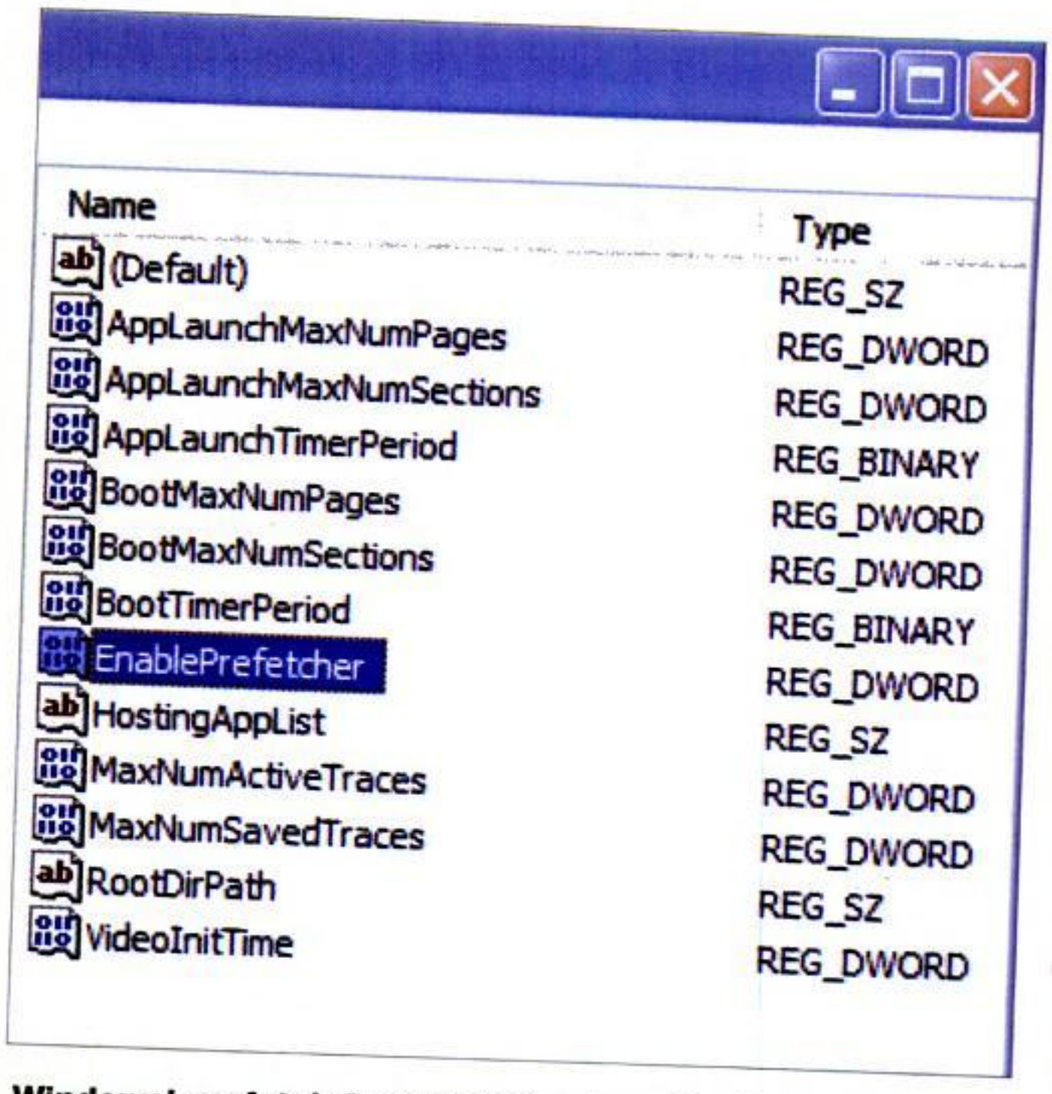
TRAIN WINDOWS TO FETCH

TIME SAVED 7 SEC

Windows XP always tries to anticipate the programs and files you'll need before you need them. Whenever you run a program or open a file, Windows will add key bits of the file to the prefetch folder on your hard drive, so the next time you open the app, it can deliver it to you faster. Sometimes, however, Windows becomes overzealous, and prefetches items you don't need, sucking up valuable system resources for apps or files you no longer have or use. You can see what Windows is prefetching by going to C:\Windows\Prefetch.

First, go into the prefetch folder and delete everything. Then open Regedit and navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\PrefetchParameters. Look for "EnablePrefetcher" in the right-side pane. Right-click it and select Modify. If you change the value to 2, it will only prefetch boot items. Type in 3 and it'll prefetch applications and boot items, which we recommend. Finally, close Regedit, and restart your computer several times to allow Windows to reconfigure the prefetch to cache what it needs.

If you'd rather specify the apps that are prefetched manually, you can set EnablePrefetcher to 2. Then, for any app you want to prefetch, right-click the app's shortcut and add /prefetch:1 to the end of the Target line. This will add that app to the prefetch list.



Windows' prefetch feature will automatically load commonly used applications and boot files, but with a simple Registry hack you can limit it to files related to booting.

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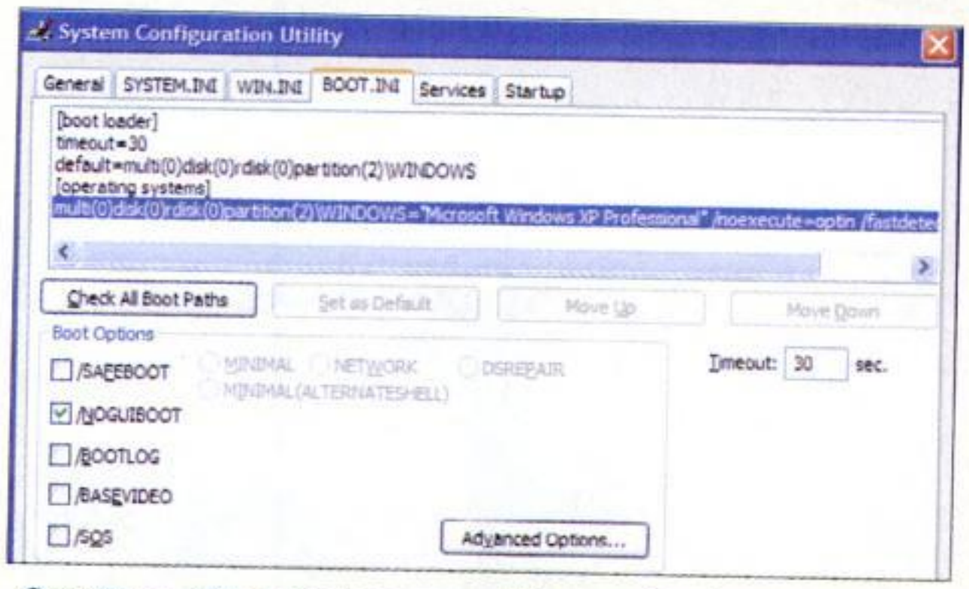
DUMP THE XP SPLASH SCREEN

TIME SAVED 2 SEC

Every time you boot, you stare at it. The same Windows XP splash screen you've been looking at since 2001. Here's how you can disable it, and eke another couple seconds from your boot. To disable the splash screen, open msconfig, and go to the boot.ini tab. Check the box labeled /NOGUIBOOT, and then restart your PC.



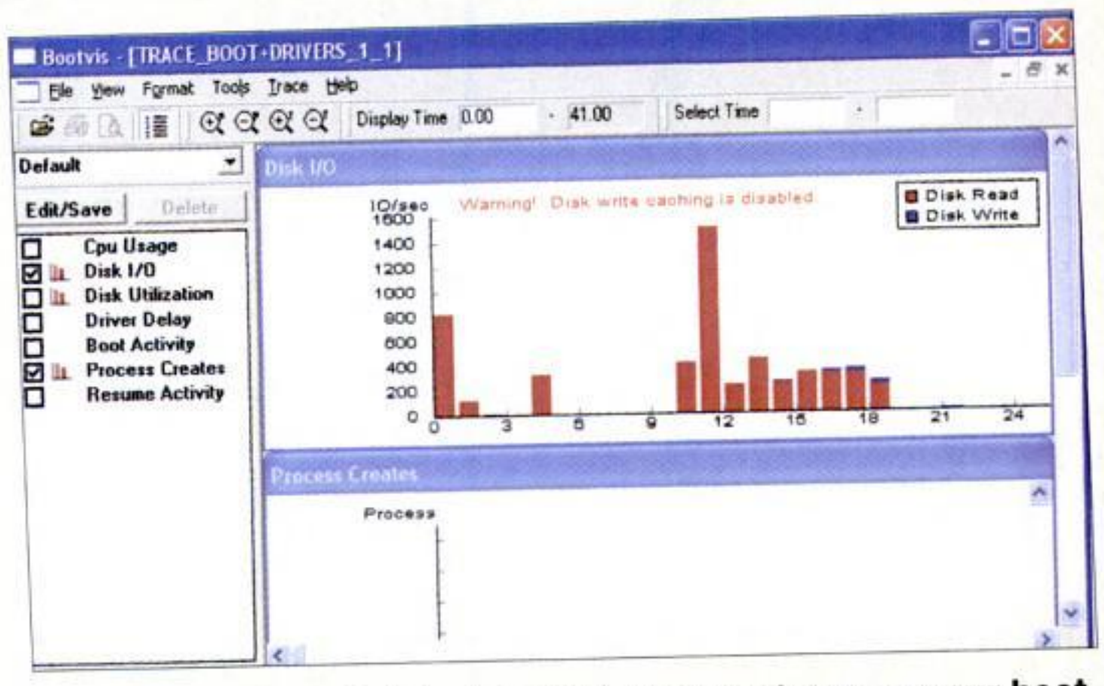
Goodbye, XP splash screen. We won't miss you.

MICROSOFT PITCHES IN WITH ITS OWN OUTLAW UTILITY

TIME SAVED 4 SEC

You might have heard about Microsoft's own boot-time optimization tool named *Bootvis*. It's been around since the launch of Windows XP, but for some reason Microsoft publicly disowned it shortly after XP's launch. According to the company, "Bootvis.exe is not a tool that will improve boot/resume performance for end users." Microsoft claims *Bootvis* just triggers the boot optimization routines that are built into Windows XP. On our test system it shaved an impressive four seconds off boot. You should be able to find the utility using Google.

Once it's installed, run the app, and click Trace, then Boot + Driver Delays. After rebooting, it'll show you an analysis of your boot sequence. Click Trace, then Optimize, and it'll reboot once again and make optimizations to your system.



Microsoft swears its *Bootvis* utility will not improve your boot times, but it helped us. You should give it a whirl.

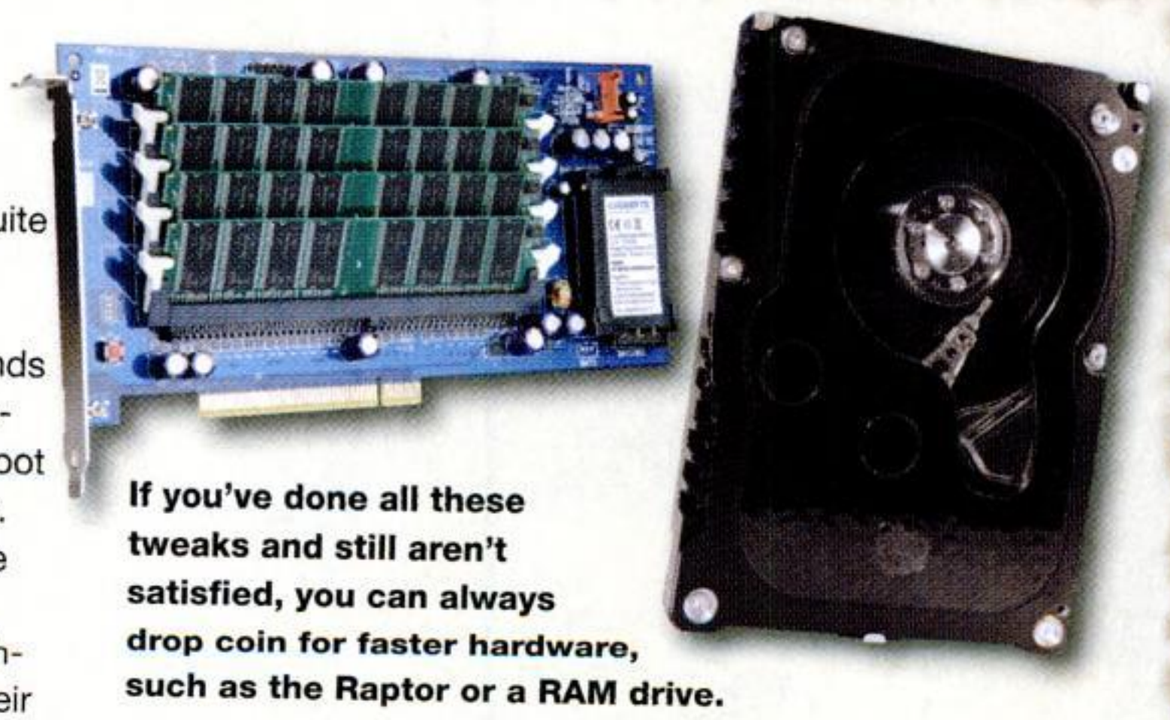
FINAL THOUGHTS

TOTAL TIME SAVED 31 SEC

Now that we're done testing, we're quite pleased with our handiwork. On our final timed run with all of our tweaks enabled, the boot went from 79 seconds to 48 seconds, a net savings of 31 seconds! Over the course of a year, if you boot your PC once a day, you'll save three hours. That's enough time to procreate, go to the DMV, or organize your *Maximum PC* archive.

There are a lot of tips we tried that turned out to be nothing but hogwash, but other techniques surprised us with their effectiveness. By pruning the BIOS and OS, anyone should be able to achieve a faster boot.

If you've gone through all of the tweaks and tips listed here, and your machine is still too slow for your liking, the only way you'll really improve performance further is to buy a faster hard drive. Because much of the boot process involves disk reads, a snappy 10,000rpm hard drive will certainly speed things along. For example, a fresh install of Windows XP boots in 38 seconds on a WD4000KD 7,200rpm drive. The same install boots in a scant 31 seconds on a 74GB Raptor. If that's not fast enough for you, you can always install a RAM drive. We installed Windows XP onto the Gigabyte i-RAM (reviewed on page 68) and managed to get a clean install of Windows to boot in a smoldering 24 seconds. MPC



If you've done all these tweaks and still aren't satisfied, you can always drop coin for faster hardware, such as the Raptor or a RAM drive.

WE WANT YOUR TIPS!

Do you have a tested and true tip for decreasing boot time? Send it to input@maximumpc.com. We'll run the best reader-submitted tips in an upcoming issue.

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Watch Video on Your PC

Video playback errors? Lack of sound? Media player crashes? Follow these tips to solve your codec issues and media player woes

TIME 00:30 HOURS:MINUTES

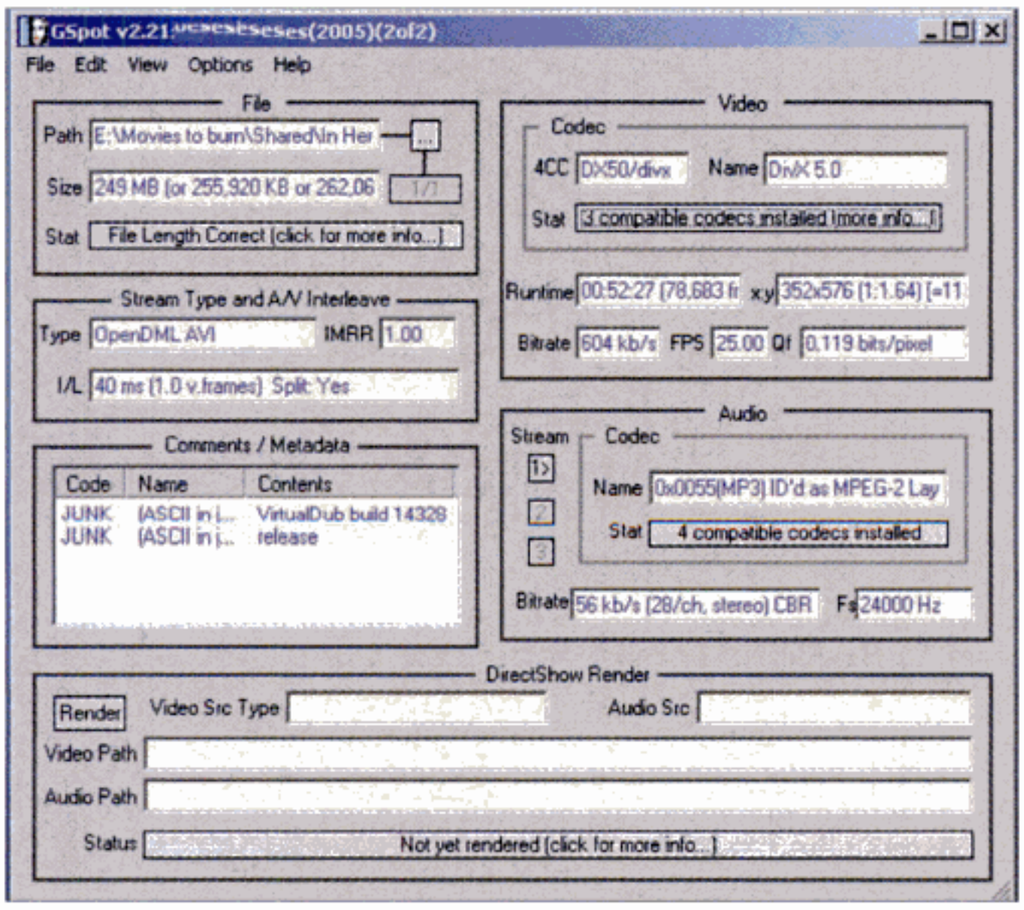
Watching movies on your PC should be a pleasurable experience, but, sadly, that's not always the case. In fact, issues such as error-prone files, poor playback, and a lack of sound, can make the experience seem like a sick joke compared with the seamless way that the DVD player attached to your TV churns out video. When you run into problems with your PC, it can be tempting to give up and go back to the sofa. But you'd be forgoing the potential convenience of having that extra DVD capability in another room, or of being able watch a movie anywhere using your laptop.

Over the next couple pages we'll tackle some of the more common problems that might crop up when you watch video on your PC, to make the experience thoroughly satisfying.

BY PAUL **TOWNSEND**

Analyze Your File

If you're having difficulty playing a particular AVI file, it could be because the file itself is damaged or incomplete. This is often the case with downloaded media. You can save yourself a great deal of time by using a utility to check the file's integrity. With the help of a program such as *GSpot*, **www.headbands.com/gspot**, you can determine whether a file is complete, what codecs are required for playback, and whether those codecs are present on your system.



***GSpot* will first analyze the video file and check that it's not truncated. It then checks whether you have adequate audio and video codecs installed. Click Stat to see which codecs will be used.**

Trim the Fat from Media Player

Playing back large video files or watching DVD movies on your PC can use a large amount of RAM and processor power. The fact that *Windows Media Player* itself consumes a great deal of power in the process doesn't help. You can improve overall performance by using an application that doesn't place as much strain on your system. This will free up resources and ensure smoother playback. To this effect, Windows XP offers a trimmed-down version of *Windows Media Player*. Click Start > Run, and type `mplayer2` and select OK to give it a try.

Use a Different Media Player

Movie files can be encoded with any one of a variety of codecs. This can have an effect on playback if your software player is unable to recognize the encoding method in use. If you're having trouble playing a particular movie file, use a different player, as this will often enable you to view the movie without any problems.

Continued on next page→

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Prevent Crashes

If you find that Windows Explorer or My Computer crashes unexpectedly when opening a folder that contains AVI files, your system could be missing the Xvid codec. You can download this codec free of charge from **www.divxmovies.com/software/**, and once it's on your system you shouldn't experience any more crashes during a folder preview.

Prevent AVI Preview

When you play back an AVI file, Windows XP attempts to extract information from the file, such as resolution, running time, and so on. This can use a great deal of your system resources, which sometimes leads to hitches in playback. You can edit the Registry and prevent Windows from reading the file before playing it. Open the Registry Editor and locate HKEY_CLASSES_ROOT\CLSID\{87D62D94-71B3-4b9a-94895FE6850DC73E}. Rename the latter part of the key by adding the minus symbol so that it reads -{87D62D94-71B3-4b9a-94895FE6850DC73E}.

Get the AC3 Codec

A common problem with *Windows Media Player* that can cause crashes or the inability to play video files relates to the missing AC3 codec. You can download the AC3 codec from **http://ac3filter.sourceforge.net/**. If this fixes your playback problem but you still experience low volume, adjust the Master and Gain controls under the AC3Filter configuration utility in the All Programs menu.

Enjoy Streamed Video

You're not restricted to watching just DVDs and movie files downloaded from the Internet on your PC. You can go online and view TV programs streamed by broadcasters all over the world, as well. Visit **www.itv.com** and select the country whose programs you'd like to see, and then click the appropriate stream. Broadcasters will use either *Windows Media Player* or *Real Player* for their video streams. The appropriate player will launch automatically when you click the program you want to view.

Bypass Region Control

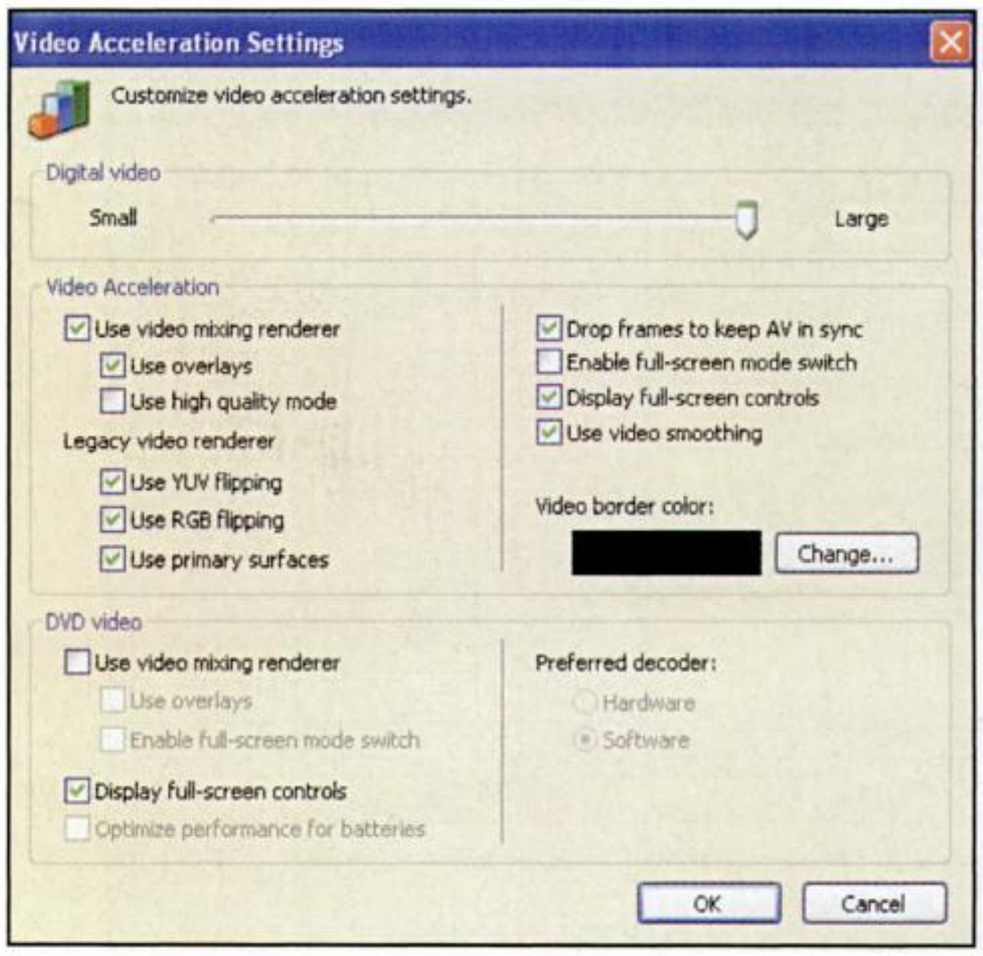
Most DVD drives are region protected—meaning they contain a code associated with a certain country—and you can only switch regions (via the firmware) a maximum of five times. After this, the region will remain fixed and further alterations aren't possible. Unless, of course, you have a utility such as *DVD Region* (free from **www.dvdidle.com/dvd-region-free.htm**). This app will enable you to watch any DVD movie on any drive. In some cases you'll find that it's your software-based DVD player that restricts which region you can watch in. To modify the region settings of a software player, use *DVD Genie* from **www.inmatrix.com/files/dvdgenie_download.shtml.**

Optimize Video Playback

Whether you have an ATI or an nVidia videocard, download the very latest drivers from the GPU manufacturer's website to enable the best video playback your card is capable of delivering. The next step is to enable hardware acceleration in your video player.

To do this for ATI cards in *Windows Media Player 10*, click the Tools menu and select Options. Next, click the Performance tab and the Advanced button. In the section labeled "Video Acceleration," place checkmarks next to "Use video mixing renderer" and "Use high quality mode." In the section labeled "DVD Video," place checkmarks next to "Use Video mixing renderer" and "Enable full-screen mode switch."

If you own an nVidia card, open *Windows Media Player 10's* Video Acceleration Settings window by following the same steps outlined above. In the section labeled "Video



Use *Windows Media Player 10's* Video Acceleration Settings dialog box to turn on hardware acceleration on videocards.

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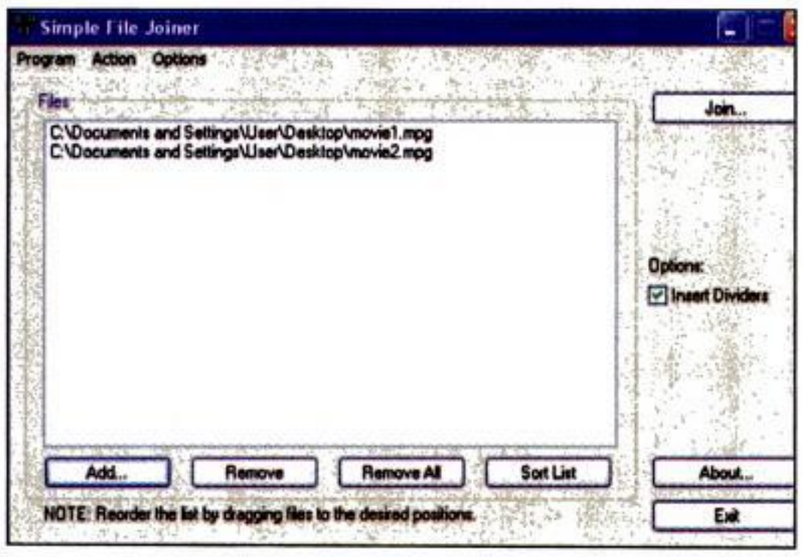
Acceleration," however, place checkmarks next to "Use video mixing renderer" and "Use overlays." In the section labeled "DVD video," uncheck "Use video mixing renderer" and place a checkmark next to "Display full-screen controls."

Join Files

You can use an application such as *Nero* to create your own DVD movies, but if the movie is made up of multiple files, each one will appear as a different chapter. You can side-step this problem by merging multiple files before you create your DVD movie. Using the utility *Simple File Joiner* (**www.peretek.com/sfj.php**) you can select MPEG files that have the same encoding and then join them together.



If you have two .mpg files you want to join, *Simple File Joiner* is a straightforward option. Simply select the appropriate file/s, then click Join. Be careful to test the new file first before deleting the old ones.

Capture a Frame

If you're trying to capture a frame of action to save as an image file, you'll find it isn't as simple as pressing the Print Screen button on your keyboard. Fortunately, some media players, such as *Nero ShowTime,* enable you to grab a piece of the action, which you can then paste into an image editing program. If your media player doesn't already provide you with a capture facility, you can use a specialist utility, such as *SnagIt*, which is available from **www.techsmith.com.** MPC

Ask the Doctor

Diagnosing and curing your PC problems

RIGHT SOFTWARE; WRONG HARDWARE

*I have a brand-new computer with a 3.4GHz CPU, a videocard based on nVidia's GeForce 7800 GT, and two Princeton 19-inch LCDs. My primary applications are Autodesk's **AutoCAD 2006** and Microsoft's **Office.** I expected this system to be blazing fast; in reality, it's slower than the three-year-old computer it replaced. Is there a video setting that will improve my PC's performance, or should I look for a different videocard?*

—Jim Moomey

Most GPU manufacturers, including nVidia and its competitors (ATI, Matrox, 3DLabs, et al), design different parts for different applications. nVidia's GeForce series of cards are optimized to render high frame rates on a single display. This makes them highly suitable to applications such as 3D gaming, but much less appropriate for productivity applications, such as *AutoCAD,* that rely on multiple displays and multiple windows. Cards based on nVidia's Quadro GPUs, on the other hand, are designed specifically for the types of applications you're using.

Here's something else you should consider when choosing a videocard for use with *AutoCAD:* Autodesk operates a certification program, in which hardware is lab tested to ensure compatibility with its software. If you're not using Autodesk-certified hardware, you might have trouble getting adequate tech support from Autodesk. (In nVidia's case, cards based on the Quadro line are certified; cards based on the GeForce are not.)

KEYBOARD AMNESIA

My DIY PC suddenly fails to recognize my Microsoft Internet keyboard. I built a 3.06GHz Intel Pentium 4 system with an Asus P4T533 motherboard. The keyboard is recognized at POST, but becomes disabled—with the exception of the email button—as soon as Windows XP Professional SP2 boots. The same keyboard works fine with my other computers, and I run into the same problem when I plug other PS/2 keyboards into this PC.

I've tried uninstalling and reinstalling the stock keyboard drivers, and I've done the same with the latest IntelliType drivers. The keyboard remains disabled even when I start Windows in Safe Mode. All my other hardware and input devices work fine. Got any ideas for me, Doc?

—Rich Quong

You have an unusual problem, Rich. The Doc's initial diagnosis is a bad keyboard controller chip. PS/2 ports are not hot-swappable ports, unlike their USB cousins, and they can get flakey after a device is plugged in while the power is on. PS/2 plugs are also susceptible to bent pins if you get too aggressive with them. The fact that they keyboard works fine with the BIOS and craps out only when you hit Windows indicates that the problem lies with the OS and not with the hardware.

Here's a treatment plan, in order of complexity: First, completely uninstall the specific device driver for your keyboard, and don't reinstall (rely on the

Continued on next page→

"Oh doctor, doctor. Can't you see my PC's failin', failin'." Is your PC sucking more wind than an '80s pop star? Send an email describing its symptoms to doctor@maximumpc.com, and the Doc will do his best to blind you with science.

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Ask the Doctor

Continued from page 49

default drivers, instead). Next, look to see if some other device is stomping on the interrupt request (IRQ) that should be reserved for the keyboard: Right-click My Computer, click Properties, the Hardware tab, and then the Device Manager button. Next, choose Resources by Connection from the View menu. Windows XP doesn't normally have any trouble sharing IRQs, but there really shouldn't be anything else that needs a priority that high. You could also ignore the problem by switching to a USB keyboard. Your last "free" option is to completely reinstall Windows.

THEY HAVE PCS IN IOWA?

My 400GB Maxtor hard drive acts really strange every time I start a game: It reads or writes something every second. I don't know if there's a utility in Windows that's causing this, if the hard drive needs to act as a time clock, or if it's just because I happen to live in Iowa. This phenomenon causes the game to freeze for a fraction of a second, and then the frame rates go back up to 80- to 90fps. The hard drive continues to behave this way for at least five minutes after I've shut down the game. I've tried everything I can think of, including ***Norton Utilities****, CHKDSK, defragging, resetting the BIOS, reinstalling all my drivers, and checking for spyware and viruses.*

I haven't always had this problem. I'm one of the few people who like ***Doom 3****, and about five months ago, I played through the entire game without any problems. There's plenty of power in my box: I'm running an nForce4 motherboard with an AMD 64 3200+ and 2GB of PC3200 RAM. My graphics card is based on nVidia's GeForce 6800 GT. You are my only hope—aside from a three-pound hammer.*

—Matthew Winfrey

Put the hammer down, Matthew, and allow the Doc to prescribe a less aggressive form of therapy. But please answer this question first: Did you play *Doom 3* on *this* drive? Because, Maxtor didn't *have* a 400GB drive when that game first came out, and that leads the Doc to conclude that you played *Doom 3* on some other drive and installed this one later. If that's the case, you've joined a large pool of folks who've discovered that nForce4 mobos and Maxtor DiamondMax 11 drives don't always play nice together. Maxtor recently released a firmware update that addresses part of the problem, but the only way to get it is by going through Maxtor's tech support. If you want to avoid jumping through those hoops, download and install Maxtor's *MaxBlast 4* utility from

There are widely known compatibility issues with nForce4 motherboards and Maxtor DiamondMax 10- and 11-series drives. Avoid the combination, if you can.

www.maxtor.com. If the utility claims the drive is healthy, but you continue to have problems, you should either contact Maxtor or consider exchanging that drive for one from another manufacturer.

HELP ME, OBI WAN

*I recently upgraded the CPU in my Asrock P4VT8+ motherboard from a Celeron D to a 3.2GHz Pentium 4 (the board supports both processors). Ever since the upgrade, when we play games (****Star Wars Galaxies*** *and my wife's Real Arcade games), the computer shuts down, the power light stays on, and I have to unplug the power cord and plug it back in order to restart it (pressing the power button does nothing).*

I never experienced this problem when the Celeron D was installed, and I haven't made any other changes to the system. CPU temps range from 53 C while running the BIOS screen, up to 73 C at idle with 38 processes running and the CPU fan spinning at 2,700rpm. I've read that Prescott chips run hot, but do you think this one might be overheating? My power supply is rated at 400 watts; judging by the racket its fan makes, I wonder if that might the culprit. But why would I have problems only while gaming?

—Kal Solidus

The first thing you should do is determine which version of Asrock's P4VT8+ you possess. Open the case and look for the number silk-screened onto the motherboard (it's usually in between the expansion slots). Asrock tells us only PCB Rev. 1.04 and later boards—which were marked with a sticker indicating support for 533- and 800MHz front-side bus Prescotts—work with those processors. Further clouding the issue, *some* Rev. 1.04 boards work with 800MHz FSB Prescotts, but not with 533MHz FSB Prescotts. You should next make sure you're running the latest motherboard BIOS.

If your motherboard indeed qualifies for your CPU, you've installed the latest BIOS, and you're still having problems, you might be dealing with a thermal problem. Although 73 C doesn't sound terrible, it could be a better. Your case might not be providing sufficient airflow for the task. Try playing games while the case is open. If you're using the same heatsink that came with your Celeron, it's probably not powerful enough to cool a much hotter Prescott. If none of those approaches solve your problem, it could be that your new power-hungry CPU and your graphics card have combined to push your power supply over the edge.

THIS IS NOT COOL

My water-cooling kit (Thermaltake's Bigwater SE) doesn't seem to be doing its job. My CPU (an Athlon 64 X2 4800+) is showing 43 C at idle, with the radiator fan on high. I am wondering if rerouting the tubing would help. It currently goes like this: pump to water block, water block to radiator, radiator to reservoir, and back to the pump. Would it make more sense to go: pump to radiator, radiator to water block, and then back to the reservoir?

—Allon Bloch

The configuration you describe is the most common alternative, and it might make a smidgen of a difference. Sending the water to the radiator and then to the water block ensures that the water is at its coldest when it enters the water block. Having said that, the temperature of the water in a cooling loop is remarkably constant. The water coming out of the radiator is a bit cooler than when it goes in, but the temperature delta is unlikely to exceed one or two degrees Celsius.

As far as your temps are concerned, 43 C at idle is high for a water-cooled rig, but it's not too high for that kit. When we tested Thermaltake's standard Bigwater kit in May 2005, we achieved an idle temp of 39 C with a 3.6GHz P4 Prescott. You'll need to upgrade to a more powerful cooling system if you want drastically lower temps. You'll find our opinion of two possible alternatives in this month's reviews section. MPC

Most water-cooling systems follow a circuit of reservoir to pump, pump to radiator, radiator to water block, water block to reservoir. This way, the water entering the water block will be as cool as it can be.

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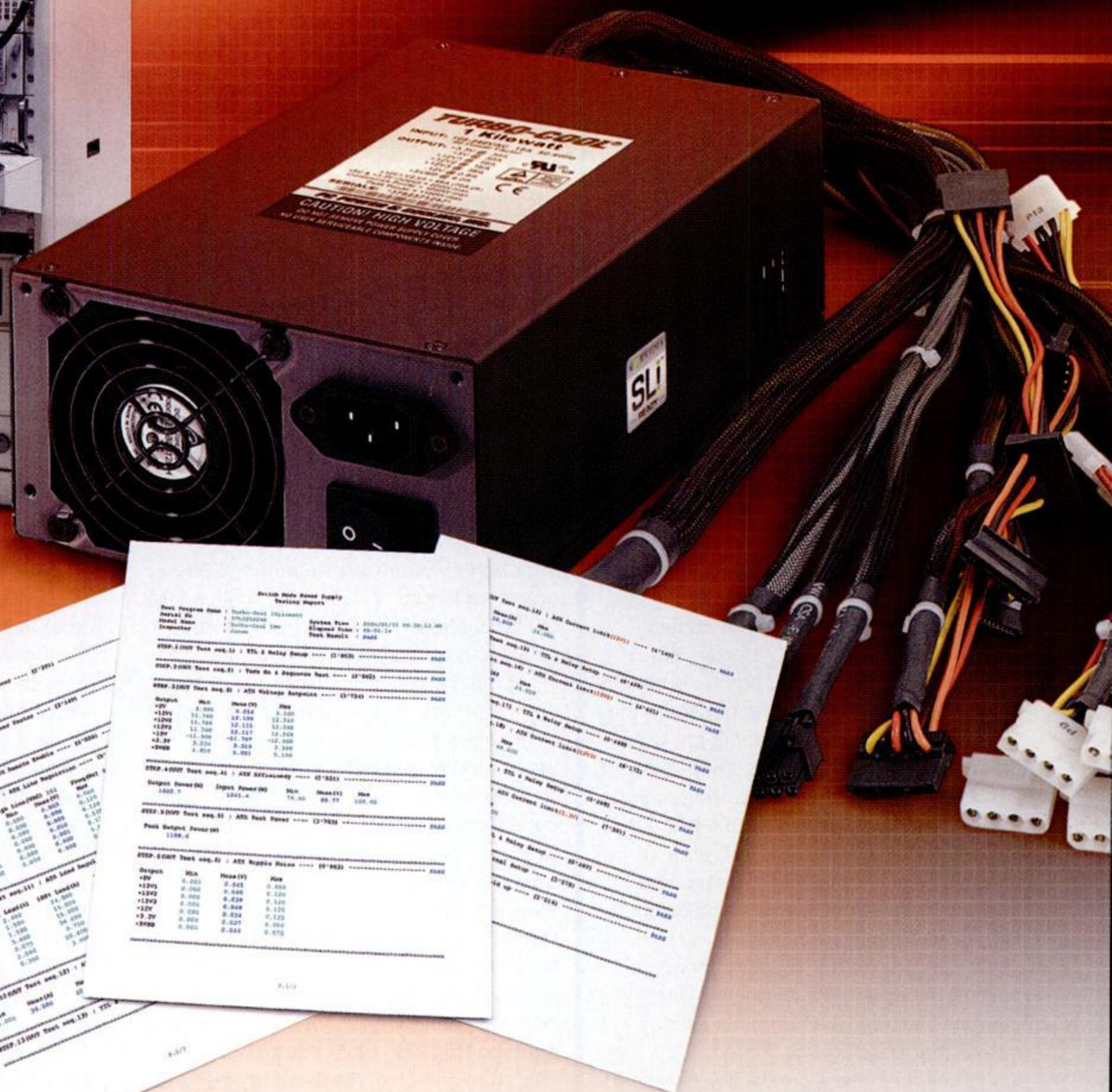

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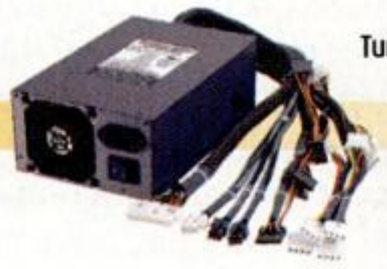

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White Paper: Creative Commons Licenses

Creative Commons licenses are a common-sense alternative to today's Byzantine copyright laws. They're just the ticket for creative people interested in collaborating and sharing ideas. Here's how they work

BY JOEL **DURHAM JR.**

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When you read an entry in a blog, see a photo on the web, or download a song from the Internet, what can you legally do with that work? Under U.S. copyright law, you really can't do anything to modify, enhance, or even duplicate the work (unless what you're doing fits within the fuzzy confines of the "fair use" clause).

So what if you create a work that you *want* people to be able to use—without forcing both parties to jump through a bunch of legal hoops? Or perhaps you only want them to ask your permission first; or you might even want them to know that they can use your intellectual property to create something new and different. A Creative Commons license makes that possible.

If you conceive a creative work—snap a picture, write a story, create a website, record a song, produce a podcast, or what have you—that work is your property. Under current copyright law, all rights to that work are automatically reserved for you; you don't have to take any other action. Anyone who wishes to reproduce that work, modify it, build on it, or incorporate it into something *they* create must contact you and ask for your express permission.

The words the author created for this article, for example, belonged to the author until the article was submitted to the editor who commissioned it. Although the contract the author signed obligated him to write a story on this topic, the article itself belonged to the author solely and exclusively until it was turned in. At that point, under the terms of the contract both parties agreed to, all rights to the story transferred to Future US, Inc., the company that publishes *Maximum PC*.

The notion that a creative work must be registered with the U.S. Copyright Office in order to be properly copyrighted is a common fallacy. Anyone can register a work with the U.S. Copyright Office by sending a copy of the work and a $30 fee to that government agency, but it's not absolutely necessary. The very act of creating something endows you with legal rights to that work until you sell or assign it to someone else. Registering your copyright with the Copyright Office provides an additional layer of protection, in that you now have dated, legal proof that the work belongs to you.

And that's great as far as it goes, but the web has added a whole new dimension to the copyright conundrum. Many people don't mind if their blog is quoted on message boards, for example, or even if their articles are reprinted elsewhere—at least within certain parameters. Establishing and enforcing those parameters under conventional copyright law typically requires a lawyer's services. Creative Commons licensing makes it easy.

CREATIVE COMMONS IN A NUTSHELL

Creative Commons is a nonprofit entity offering six types of intellectual-property licenses—and all the legalese to back them up. It's free to use, there's no registration required, and the license models cover all sorts of original works, including written word, music, photographs, videos, and educational materials. (It's important to note, however, that Creative Commons licenses are not appropriate for software or any invention that requires patent protection.)

Here's how Eric Steuer, Creative Director of Creative Commons, sums up the new licensing scheme: "Creative Commons licensing offers another layer of copyright that you can add to your standard copyright. Whereas copyright means 'all rights reserved,' with Creative Commons you can make it '*some* rights reserved.'"

But will this type of protection hold up in court? "Two current court actions have been filed, and they're not resolved yet," said Steuer; "there have not been any resolved cases in court." Steuer noted, however, that the GNU Public License (GPL), which is often used for licensing open-source software, is similar in spirit to Creative Commons—and the GPL *has* been upheld in court. "The [Creative Commons licensing] code has been written with the idea that it would be enforceable," said Steuer. "There have been so many examples of it working

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correctly. There have been very few cases where it goes to court."

USE MY WORK, PLEASE

Obtaining a Creative Commons license is very simple. Here's what you'd do if you wanted to protect a short work of fiction that you've written and published on your website:

Visit the Creative Commons web site at **www.creativecommons.org** and click the large "Publish Your Stuff" button to launch the licensing wizard. The next page presents you with a number of questions (each of which has a "more info" link that provides detail about the question). The questions include:

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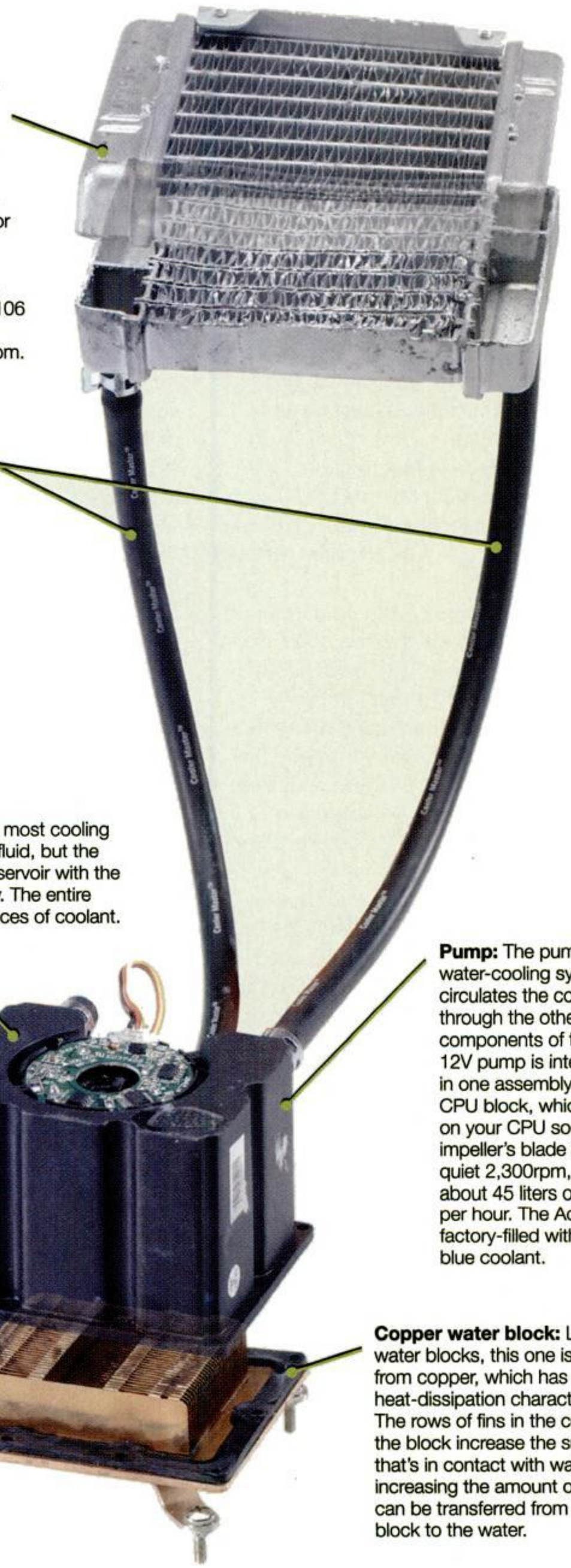
You should place the appropriate Creative Commons symbol(s) on the work you've created and include the URL where people can find an explanation as to which rights you've reserved. If you publish the material on a website, you'll even get this information encoded in HTML that you can cut and paste in with your other code. If what you're copyrighting isn't text—a digital photo that's been published online, perhaps—you can embed Creative Commons licensing into the photo's metadata. In fact, Yahoo and Google will both locate Creative Commons-licensed content on the web for you.

Most U.S. copyright law was written long before the Internet and the web became so prevalent. Creative Commons not only takes the notion of copyright protection into the digital age, it also simplifies the process and makes collaboration much easier. If you've created original works that you'd like to share with other creative folks—without giving away all of your legal rights in the process—Creative Commons is the answer. MPC

Water-Cooling Kit

Cooler Master's AquaGate Mini is the only CPU water-cooler on the market with an integrated water block, pump, and reservoir. To see its inner workings for ourselves, we broke out the hacksaw and 'disassembled' the kit—with extreme prejudice



Radiator/fan: The radiator and fan exhaust the heat generated by your CPU from the case. We cut the aluminum-alloy radiator in half to show its louvered-fin design, which offers superior cooling performance to a straight-fin design. An adjustable-speed 12cm fan (not shown) pushes about 106 cubic feet per minute of air when it's running at 2,800rpm.

Tubing: The diameter of a water-cooler's tubing helps determine the device's flow rate. The quarter-inch (internal diameter) tubes in the AquaGate are as small as they come. Narrow tubes do offer some benefits, however; they're easier to route and less prone to kinks.

Reservoir: The reservoir in most cooling kits is a bucket to hold the fluid, but the AquaGate combines the reservoir with the CPU block/pump assembly. The entire system holds about 12 ounces of coolant.

Pump: The pump in a water-cooling system circulates the coolant through the other components of the kit. This 12V pump is integrated in one assembly with the CPU block, which mounts on your CPU socket. The impeller's blade spins at a quiet 2,300rpm, moving about 45 liters of coolant per hour. The AquaGate is factory-filled with crystal-blue coolant.

Copper water block: Like most water blocks, this one is made from copper, which has excellent heat-dissipation characteristics. The rows of fins in the center of the block increase the surface area that's in contact with water, thus increasing the amount of heat that can be transferred from the CPU block to the water.

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Preview

nVidia's GeForce 7900 GTX Quad SLI

Q: What can a gamer do with four GPUs in one mobo? A: Anything he wants

Does anyone really *need* the horsepower that four of the world's fastest GPUs running in lockstep can deliver? It's a fair question, and the answer depends in large measure on how much you're willing to spend in order to play the world's most demanding games at ultra-high resolution.

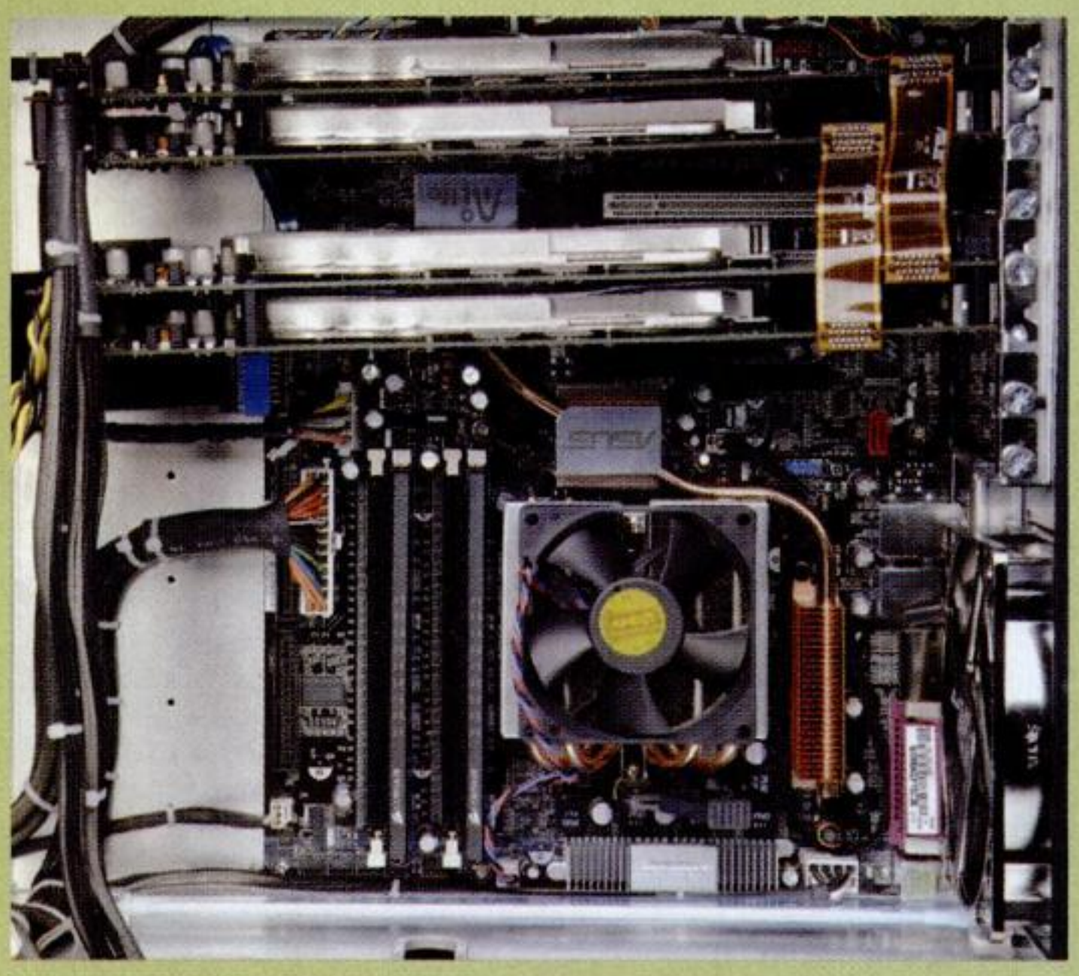
Just how high is "ultra high"? Try 2560x1600—with antialiasing and anisotropic filtering enabled to smooth every one of the more than four million pixels splashed across your 30-inch LCD. Let's take a hands-on look at nVidia's quad-SLI.

—BY MICHAEL BROWN

nVidia made a huge splash by partnering with Dell to introduce the first quad-SLI PC at the Consumer Electronics Show back in January. Of course, the Dell-specific launch irritated many of nVidia's system-vendor partners by implying that quad-SLI would be available exclusively from Dell, but we fully expect to see quad-SLI systems from all the usual boutique gaming rig suspects.

In fact, nVidia recently gave us a hands-on first look at a decidedly un-Dell-like quad-SLI prototype system, based on a 2.6GHz AMD Athlon FX-60 CPU running in an Asus A8N32-SLI motherboard. Naturally, we couldn't pass up an opportunity to see what four 500MHz GeForce 7900 GTX GPUs could do.

The first things you notice when you look into the guts of a quad-SLI system are the four full-length PCI boards. Closer examination reveals that two of the cards are physically bolted to the other two, but only one card in each pair is actually plugged into a x16 PCI Express slot. Two SLI ribbon connectors stretch between the cards—one between A and C, and a second connects cards B and D.



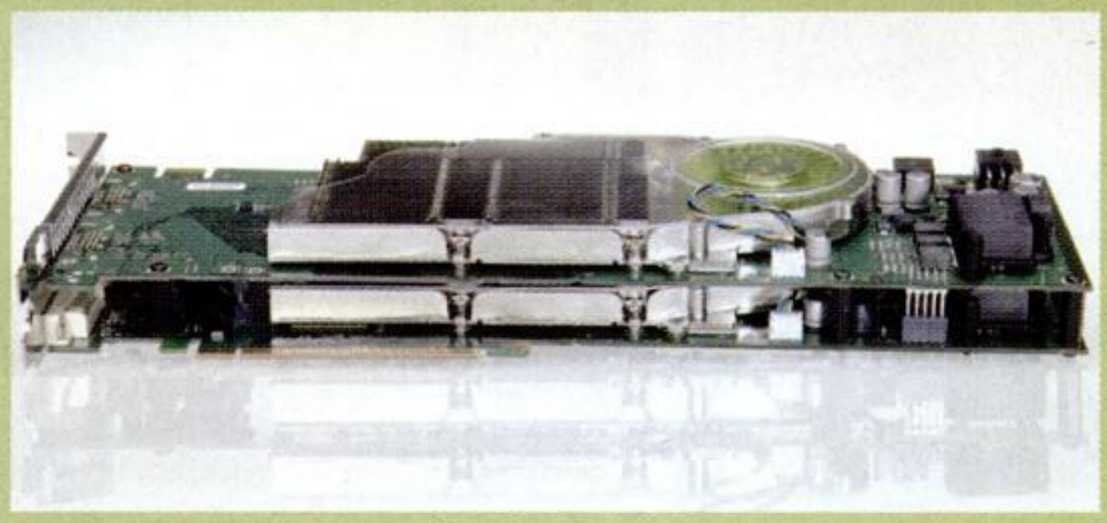
The circuit boards in this quad-SLI prototype are extraordinarily long; fortunately, each card requires just a single-slot cooler.

Each of the four cards requires its own power-supply connection, but system vendors can choose to either build in hefty internal power supplies (think 800- to 1,000 watts) or use one or more external power supplies. It will be interesting to see what types of mechanisms vendors deploy to support these cards in their cages; as the photo on this page shows, these engineering samples were keeling over like drunken sailors by the time we'd finished testing.

We tested the quad-SLI setup with *Far Cry, Doom 3,* and *FEAR* running on Apple's 30-inch Cinema Display and were impressed with the results. The games not only looked fantastic, but playing them at the monitor's native resolution delivered an incomparably immersive gaming experience. The display filled our entire field of vision.

Quad SLI delivered impressive frame rates at the highest resolutions we've ever dared test. With *Far Cry* set to 2560x1600 with 4x antialiasing and 8x anisotropic filtering, the Research demo script ran at a blistering 58.14 frames per second. *Doom 3's* Timedemo 1, meanwhile, ran at a blazing 78.5fps with the same settings. Unfortunately, we don't have accurate *FEAR* results because a documented bug dramatically slows frame rates when you enable antialiasing and soft shadows. But *we can* tell you that the game looks breathtaking at 2560x1600.

nVidia expects that quad-SLI systems will be available at retail by the time you read this, and we expect to have reviewable product in time for our next issue. But don't expect to build your own quad-SLI rig. For the time being, purchasing a new PC is the only way you'll be able to lay your hands on the technology—nVidia says that getting the tech working might be too difficult for even an enthusiast. We can't wait.



Only one card in each pair will plug directly into a x16 PCI Express slot. The other two communicate with the other cards using a custom bus.

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Preview

High-end Wireless-Audio Systems

Manufacturers of two of the highest-rated—and most expensive—wireless streaming-audio systems we tested in 2005 are introducing new products for 2006. Here's a first look

SONOS ZONEPLAYER 80

The Sonos Digital Music System not only earned a 9 verdict and a Kick Ass award when we checked it out in April 2005, it also captured the Wildcard entry in our 2005 "Gear of the Year" awards. Sonos' upcoming ZonePlayer 80 looks as though it will remedy the two most significant criticisms we leveled at the original product.

The first Sonos system was equipped with a great-sounding, but somewhat underpowered 50-watt amplifier, although the amp was superfluous for anyone interested in connecting the streaming box to self-powered speakers. And those who wanted to integrate the Sonos into their home-theater systems were likely disappointed by the absence of digital-audio outputs. By shedding the built-in amp, Sonos was able to shrink the ZonePlayer 80's price tag; and by adding optical and coaxial digital-audio connections, the company remedied another of that product's few shortcomings.

Sonos will widen its wireless-audio offerings when it adds the cost-reduced ZonePlayer 80 to its lineup.

The ZP80 will keep all the other advanced attributes that made the original product so appealing, except that it will have a two-port 10/100Mb/s Ethernet switch (the original system had a four-port switch). As of press time, Sonos was expecting to price single ZP80 modules at $350 each; a pair of ZP80s bundled with Sonos' awesome CR100 remote control is expected to fetch $1,000.

OLIVE OPUS

Audiophiles will be interested in checking out Olive's next audio-streaming device. The Opus follows in the footsteps of the company's earlier Symphony and Musica devices (the latter earned a 9/Kick Ass verdict in our January 2006 issue), but this model will be equipped with a whopping 400GB hard drive.

Like its siblings, the Opus is equipped with a tray-less optical drive that can automatically rip a CD, encode the tracks in one of several lossless formats (including WAV, AAC, and FLAC), tag them with data from its built-in database, and store them on its internal hard drive. You'll be able to integrate the device into your home network using either its 802.11g wireless access point or its built-in four-port 10/100 Mb/s Ethernet switch.

The Opus will play back digital audio with the help of four Burr-Brown 24-bit/192kHz digital-to-audio converters, using 8x oversampling and a 352.8kHz sample rate that promises to deliver pristine audio. The aluminum chassis and the drop-down faceplate covering the CD slot, meanwhile, are designed to eliminate vibration and operating noise emanating from both internal drives. All these high-end features will come with an equally high-end price tag of $3,000 when the Opus ships. HPC

Olive's ultra high-end Opus CD ripper/player and streaming-audio device comes with an ultra high-end price tag to match: $3,000.

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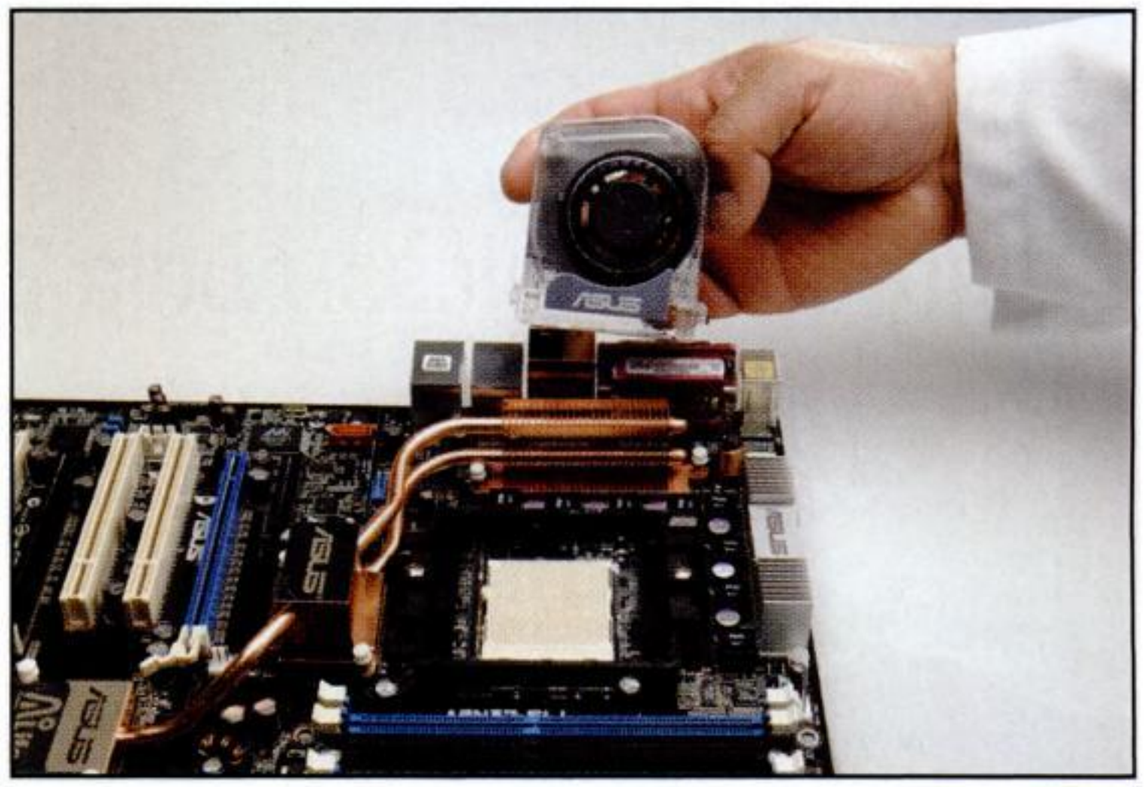
GORDON **MAH UNG**

Contemplates the Overheating Chipset

Water-cooling poses new problems for DIY builders



The Asus A8N32-SLI Premium uses a heat pipe to cool the chipset, but an optional fan is included for water-cooling setups.

The quest for quiet, high-performance computing is frequently fraught with problems and incompatibilities. Over the last few months, I've been running into snags trying to balance system performance and noise output, which was never a problem just a couple of years ago. Water-cooling seems like an easy solution, but it isn't without problems. In addition to the challenges the average do-it-yourself guy or gal faces when running coolant-filled tubing in and out of a PC, there's the question of how to cool the rest of your components?

Of particular concern are the chipset and voltage-regulator modules (VRMs)—the little components that surround your CPU—on today's motherboards. According to one motherboard manufacturer, typical performance chipsets used to consume no more than 12 watts. The nForce4 chipset consumes a whopping 30 watts—that's more than some mobile CPUs consume. And as desktop CPUs have evolved into power hogs, motherboard vendors have had to beef up VRMs, which themselves generate more heat than ever before.

These components must be kept cool for your PC to remain stable during hot summer months, when ambient temperatures rise. Today's motherboards are designed for a CPU fan to circulate air around the CPU socket, and motherboard vendors count on that air to cool the chipset and voltage regulators as well. So when someone replaces the CPU fan with a water-cooling rig, it can create system stability problems, something I've observed first-hand.

Gigabyte's GA-G1975X mobo is one solution that could work for water-cooling configurations. Unfortunately, the four small fans that Gigabyte uses to keep the chipset, VRMs, and even the RAM cool are loud. Other motherboard vendors are using similar solutions, including clip-on fans and cooling mechanisms mounted on the ATX I/O connector.

At this year's Intel Developers Forum, Intel warned system vendors to keep chipsets and VRMs cool, and showed off its Advanced Liquid Cooling as a solution. Intel's design is conceptually similar to Cooler Master's AquaGate Mini, but the Intel design exhausts air out the rear of the PC *and* through small bottom port that blows into the PC to cool the VRMs and chipset.

The upshot is that if Intel is worried about keeping these components cool, you should be worried too. If you're only cooling your videocards and CPU, you're job isn't done yet.

Josh Norem

Goes to Boot Camp

There's only so much you can do to reduce the wait

I learned tips that can shave precious seconds off the boot time of any machine.

The mandate from our dear leader this month was simple: I was to shave as many seconds off my PC's boot time as the law allows, and it had better be *a lot*. We didn't want to build a story around the premise of reducing a PC's boot time if the net gain was a measly three seconds. In order for the story to work, I needed to perform major surgery, and the PC I chose for this operation was an excellent patient—my two-year-old, company-issued Dell workstation.

I chose the Dell because we simply don't have many two-year old installations of Windows in the Lab. And because I only use this machine for work, and I leave it on all the time, I haven't really paid attention to its boot time. When I did actually time it, I was appalled, and quite frankly, embarrassed. One minute, 19 seconds? This will not stand!

I knew going in that I wouldn't find a silver bullet—a tip or tweak that nobody has discovered that would miraculously reduce my boot time to less than 15 seconds. Windows XP has been on the market for more than five years now, and all of its inner secrets have already been unearthed. So I set out to learn these secrets, then verify or debunk them, one at a time.

As it turns out, I found a ton of tweaks that decreased XP's boot time, as well as a few that did nothing or actually slowed the process. It's important to remember that your hard drive's speed directly affects XP's boot time. Install Windows on a faster drive, and it will boot faster. But Windows is still a plodding, lumbering oaf—at least when it comes to boot speed. Even installed on a RAM drive, XP took 24 seconds to boot. That's just sick and wrong.

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How We Test

Real-world benchmarks. Real-world results

Computer performance used to be measured with synthetic tests that had little or no bearing on real-world performance. Even worse, when hardware vendors started tailoring their drivers for these synthetic tests, the performance in actual games and applications sometimes dropped.

At *Maximum PC*, our mantra for testing has always been "real-world." We use tests that reflect tasks power users perform every single day. With that in mind, here are the six real-world benchmarks that we use to test every system we review.

SYSmark2004: This is the most comprehensive application benchmark available, using no fewer than 19 applications to measure the time it takes for the PC to complete to real-world computer-intensive tasks. Our *SYSmark* score is a composite based on the time the test takes to complete several different types of tasks.

Adobe Premiere Pro: The leading nonlinear digital-video editor has recently been retooled with more support for multi-threading. We take a raw AVI file, add several transitions and a soundtrack, export it to a generic MPEG-2 file, and then report the time the script takes to complete.

Adobe Photoshop CS: We don't subscribe to Apple's half-baked idea that running one filter test in *Photoshop*, in one certain way, at a particular time of day provides an accurate measure of performance. Instead, we take a high-resolution image and throw it through just about every filter available in *Photoshop CS* at it. Our score is the time it takes for the script to complete.

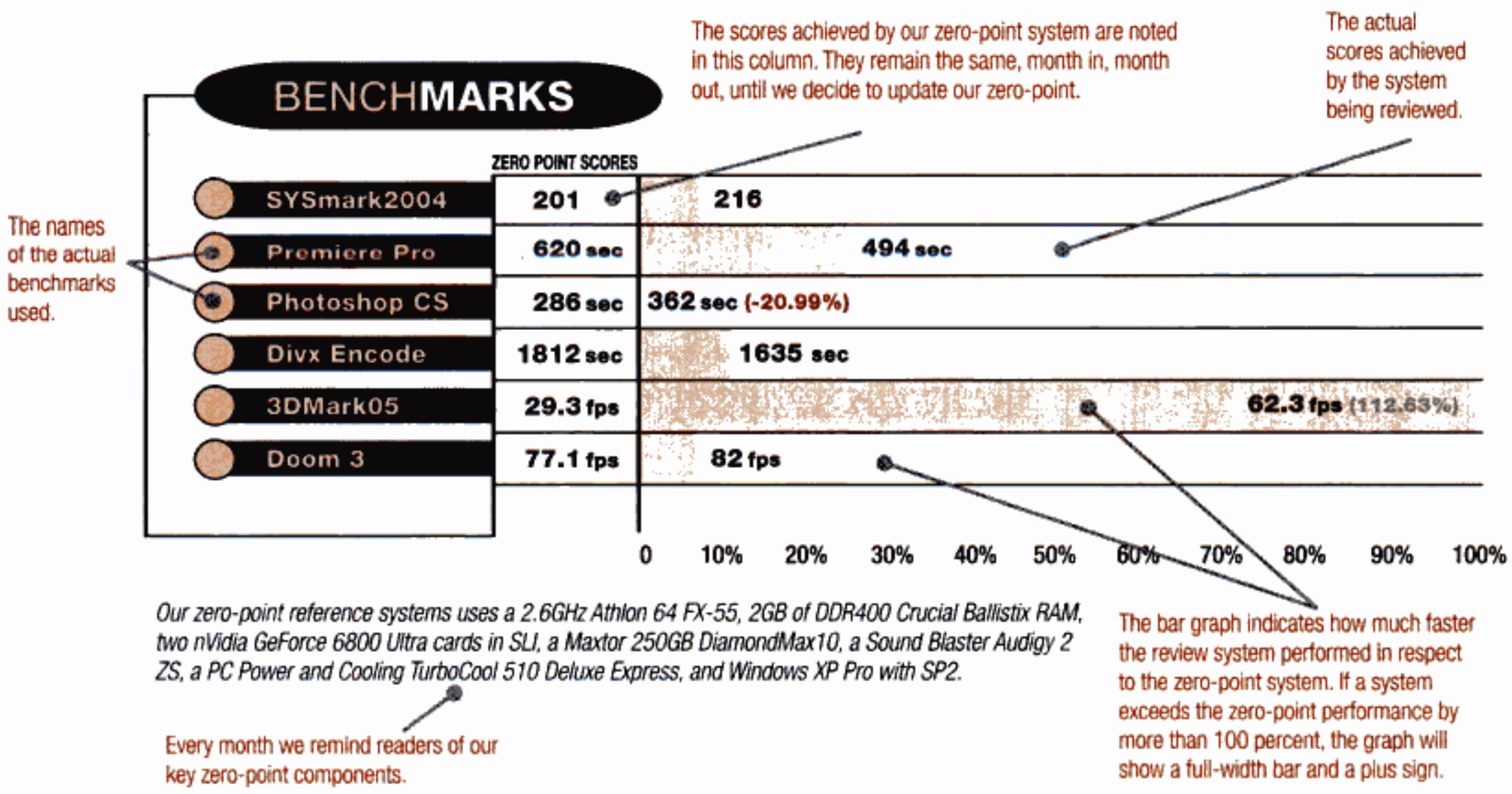
Divx Encode: Video encoding is today's time-suck. We transcode a short movie stored on the hard drive from MPEG-2 to Divx using *#1 DVD Ripper.* We report the length of time the process takes to complete.

3DMark05: After ranting about real-world tests, you might be surprised to find this "synthetic" graphics test in our suite. *3DMark05*, however, has proved to be the standard by which graphics cards and PCs that run them are judged. Instead of reporting a meaningless composite score, we run the third test at 1280x1024 with 4x antialiasing and 4x anisotropic filtering, then report the frame rate. Our zero-point system with SLI can't even break 30 frames per second.

Doom 3: Id's hugely popular game is a dark, scary, and serious test of PC horsepower. We run this game with 4x antialiasing and 4x anisotropic filtering, at 1600x1200 resolution, and report the frame rate.

How to Read Our Benchmark Chart

Maximum PC's test beds double as zero-point systems, against which all review systems are compared. Here's how to read our benchmark chart.


BENCHMARKS
The scores achieved by our zero-point system are noted in this column. They remain the same, month in, month out, until we decide to update our zero-point.
The actual scores achieved by the system being reviewed.
ZERO POINT SCORES
The names of the actual benchmarks used.
SYSmark2004
201
216
Premiere Pro
620 sec
494 sec
Photoshop CS
286 sec
362 sec (-20.99%)
Divx Encode
1812 sec
1635 sec
3DMark05
29.3 fps
62.3 fps (112.63%)
Doom 3
77.1 fps
82 fps
0
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Our zero-point reference systems uses a 2.6GHz Athlon 64 FX-55, 2GB of DDR400 Crucial Ballistix RAM, two nVidia GeForce 6800 Ultra cards in SLI, a Maxtor 250GB DiamondMax10, a Sound Blaster Audigy 2 ZS, a PC Power and Cooling TurboCool 510 Deluxe Express, and Windows XP Pro with SP2.
Every month we remind readers of our key zero-point components.
The bar graph indicates how much faster the review system performed in respect to the zero-point system. If a system exceeds the zero-point performance by more than 100 percent, the graph will show a full-width bar and a plus sign.

BEST OF THE BEST

Our monthly category-by-category list of our favorite products. New products are in red.

High-end videocard:
nVidia GeForce 7900 GTX
nVidia was out of the top spot for exactly one month before the 7900 GTX showed up

Midrange videocard:
Leadtek WinFast 7800GT TDH Extreme

Soundcard:
Creative Labs X-Fi Xtreme Music

Hard drive:
Western Digital WD4000KD

External backup drive:
Western Digital Dual-Option Media Center 320GB

Portable USB drive:
Seagate Portable External Hard Drive 100GB

DVD burner:
Plextor PX-716A

Widescreen LCD monitor:
Dell 2405FPW

Desktop LCD monitor:
Samsung 940BF

Socket 939 Athlon 64 mobo:
MSI K8N Diamond Plus
Slightly better benchmark results and sweet bonus features put the MSI K8N on top

Socket 775 Pentium 4 mobo:
Asus P5WD2-E Premium
CrossFire support and the possibility of running Conroe make the P5WD2-E our top pick

Portable MP3 player:
Apple iPod

5.1 speakers:
M-Audio Studiophile LX4 5.1 (LX4 2.1 with 5.1 Expander System)

2.1 speakers:
M-Audio Studiophile LX4 2.1

Mid-tower case:
Lian Li PCV-1100

Full-tower case:
Silverstone TJ07

Games we are playing: Battle for Middle Earth II, Sims 2: Open for Business, Galactic Civilizations II: Dread Lords, Battlefield 2

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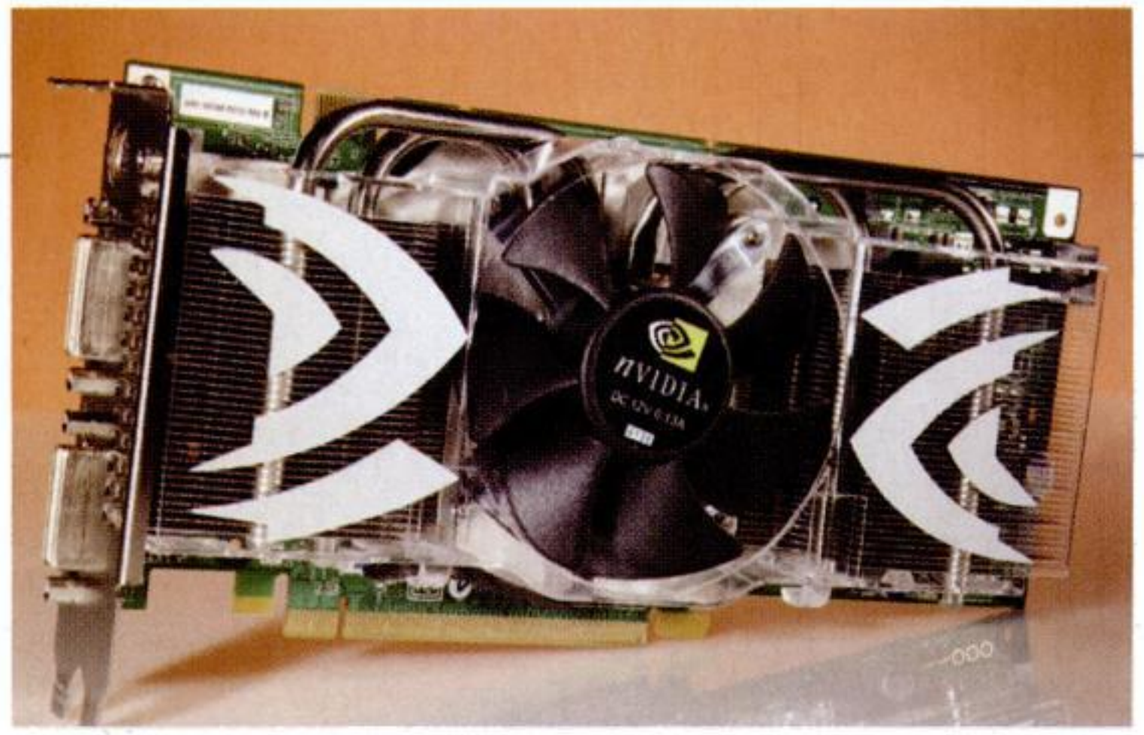
nVidia GeForce 7900 GTX

And it's nVidia—by a nose!



nVidia's 7900 GTX looks very much like the high-end part it's replacing. You could almost say the same of its insides, too, since it has the same numbers of pixel pipelines (24), pixel-shader units (48—two for each pipe), and vertex shaders (8) as the 7800 GTX.

We've witnessed an awful lot of chest-thumping in the ATI and nVidia camps over the past few months, with both companies hurling rocks at each other over who's bigger, who's faster, and who's better looking. Of course, it all boils down to which videocard deserves your dollar, and when it comes to high-end videocards for gaming, we think it's nVidia and its GeForce 7900 GTX.

The bulk of our 3D benchmark scores tell us that one 7900 GTX is just slightly faster than a single Radeon X1900 XTX. We saw similar results running two of these monsters in SLI. It's not a blow-out, but two 7900 GTX cards did pull out in front of two of ATI's best in CrossFire mode to claim the dual-card performance crown.

There's one area, however, in which ATI maintained the lead it established when it finally shipped drivers that unleashed the power of its Avivo technology: video image quality. However unlikely the scenario might be, if you use your PC primarily to watch DVD movies, we think ATI has the better solution—and it doesn't cost anything extra. This advantage disappears in CrossFire mode; in fact, you must disable CrossFire in order to enable Avivo.

Still, obtaining the best video performance nVidia's hardware can offer means buying either nVidia's $30 *PureVideo* decoder or the latest DVD player software from CyberLink *(PowerDVD)* or InterVideo *(WinDVD),* which now come with *PureVideo* built in.

The 7900 GTX isn't the first nVidia GPU to use a 90-nanometer manufacturing process, but it is the first time nVidia has used this technology to build its flagship GPU (nVidia's first 90nm part was the entry-level 7300 GS, introduced back in January). The new process enabled the engineers to shrink the part's die size to 196 square millimeters (the previous top-end chip, the 7800 GTX, measured 334 square millimeters; ATI's X1900 XTX is 352 square millimeters). It also allowed engineers to realize design efficiencies that helped them reduce the new chip's transistor count from the 7800 GTX's 302 million transistors to 278 million.

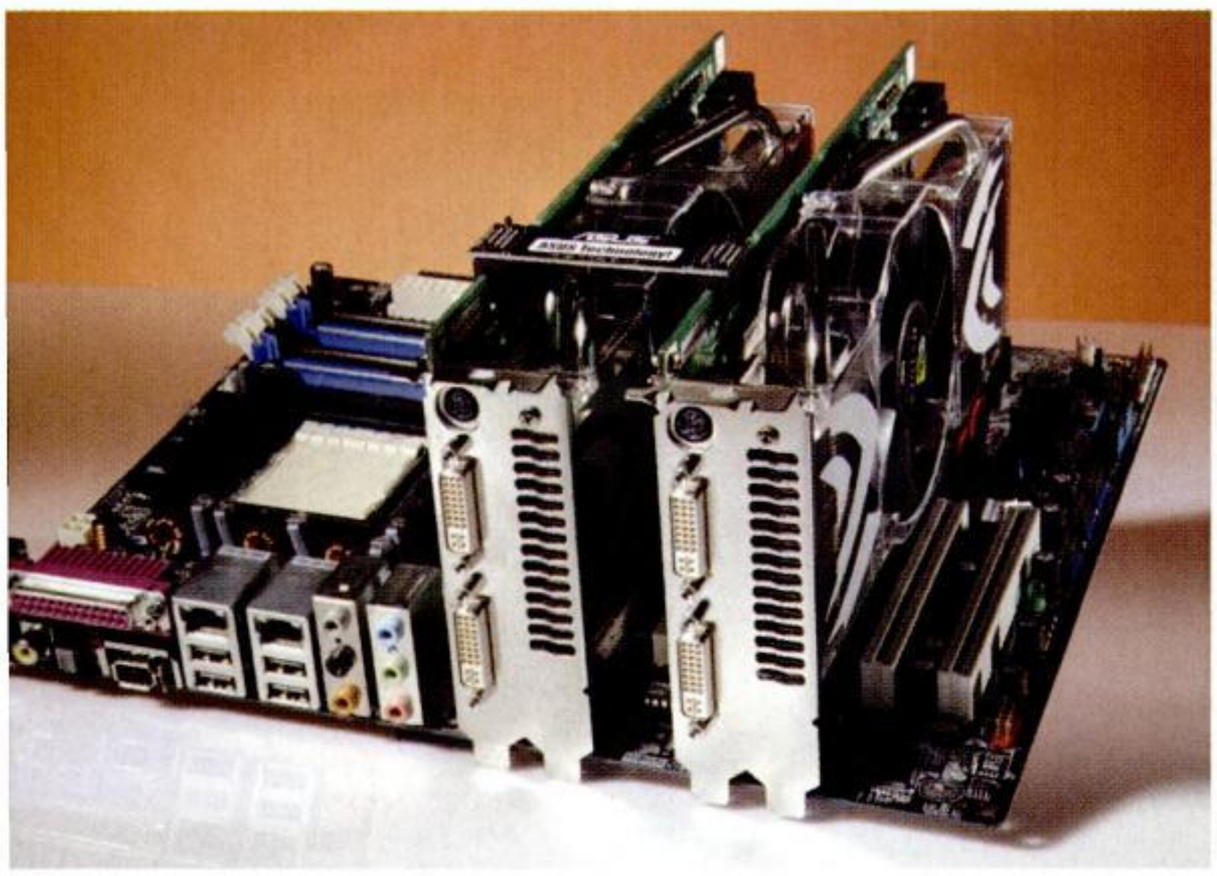
The benefits of these design changes manifest themselves in both a higher core-clock speed—650MHz—and lower power consumption (our tests indicated 275 watts at peak for a system with a single card and 360 watts at peak running two cards in SLI). The new card's 512MB of memory is actually clocked slower than that of the 512MB 7800 GTX (800- vs. 850MHz). Less power draw equals less heat, which lets nVidia use the same quiet dual-slot cooler from the 512MB 7800 GTX (which had a 550MHz core).

You'll encounter another benefit of architecture simplification when you go shopping for a new videocard powered by the 7900 GTX: nVidia anticipates its manufacturing partners will price their cards starting at just $500. At press time, this was in the same range as the typical 256MB 7800 GTX card, and it was considerably less than the average-priced card powered by ATI's Radeon X1900 XTX.

So how does all this translate to real-world performance? As you can see from the benchmark chart, the 7900 GTX spanks ATI's X1900 XTX in *3DMark03* in both single- and dual-card scenarios. nVidia is way ahead in *Doom 3,* too. (It's a

SPECS

GPU	GeForce 7900 GTX
MEMORY	512MB GDDR3
CORE CLOCK SPEED	650MHz
MEMORY CLOCK SPEED	800MHz



nVidia's SLI dual-videocard technology continues to provide the company with a competitive edge over arch rival ATI and its less elegant CrossFire solution.

BENCHMARKS

	7900 GTX	X1900 XTX	Two 7900 GTX SLI	X1900 XTX and XT CROSSFIRE
DOOM 3 (FPS)	**74.8**	71.7	**98.8**	94.7
3DMARK03	**21,616**	18,252	**34,454**	29,326
3DMARK05	10,536	**11,073**	12,748	**12,751**
3DMARK06	**5,149**	4,995	6,758	**6,776**
3DMARK06 SM 2.0	**2,570**	2,288	**3,702**	3,643
3DMARK06, HDR/SM 3.0	2,466	**2,541**	3,944	**4,067**
HQV SCORE	56	**93**	**56**	WNR

Best scores are bolded. Visit www.maximumpc.com/benchmarks for additional details.

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mystery to us why ATI hasn't figured how to write better OpenGL drivers.) ATI's card pulls out a solid win in *3DMark05,* but nVidia pulls within a hair's breadth of a tie when you compare dual-card scenarios. The two cards' *3DMark06* scores are also very close, with nVidia beating ATI in single-card mode and ATI squeaking out a win in the dual-card contest.

For folks who want superior video on their PC, and who are committed to a single-videocard lifestyle, ATI and its Avivo technology are pretty compelling. For gamers looking for pure power, however, ATI's dual-card CrossFire solution falls short where nVidia's GeForce 7900 GTX soars. Indeed, the 7900 GTX will win the hearts and minds of gamers who want the total package.

—MICHAEL BROWN

NVIDIA GEFORCE 7900 GTX

GREEN TEA

Bests competition in most 3D benchmarks; SLI is a superior dual-card solution.

GREEN CHEESE

Lags the competition when it comes to video image quality.

9

MAXIMUM PC KICKASS

$500, www.nvidia.com

Voodoo OMEN a:121 CrossFire

Beauty meets brawn in this hyper-expensive gaming rig

Many PC vendors put case windows on their systems, but few consider whether the system's interior is actually worth looking at. It's like the guy at the beach with a bad farmer's tan—some things just shouldn't be out in the open.

Not so with Voodoo's Omen a:121 CrossFire, which is totally justified in putting its innards on display. The Omen features Voodoo's oft-imitated but rarely duplicated, stealth wiring job. Does Voodoo make its cables from the same material used for Reed Richards' costume, or what?

Voodoo flies the Canadian flag with a powerful pair of ATI videocards.

The Omen's Swiftech-based water-cooling also charms. The company skillfully connected water blocks to the CPU, north bridge, and both videocards in the system. You don't have to worry about the motherboard's voltage regulators overheating; Voodoo placed a low-rpm 12cm fan at the rear of the PC to keep air moving.

The cooling system is impressive, but the hardware it serves is even more so. The Omen is host to the reigning CPU-performance champ: a dual-core AMD Athlon 64 FX-60, overclocked from 2.6GHz to 2.92GHz. Voodoo paired the FX-60 with 2GB of Corsair DDR400 and a pair of ATI's X1900 XT cards running in CrossFire mode. The system sports an Asus A8R32-MVP motherboard, which uses ATI's new CrossFire Express 3200 chipset—so both of the X1900s will run in full PCI Express x16 mode. Did we mention the *four* 150GB Raptors? One 150GB 10,000rpm Raptor is fast, but four in RAID 0 gives you average read speeds of about 250MB/s. You won't see better hard drive performance than this system's 600GB array.

Voodoo's Omen is a wireless wonder: Just where the hell are the wires hidden?

We were pretty excited to see how CrossFire would stack up. We haven't reviewed a desktop system with ATI videocards in ages, but our stand-alone tests of the X1900 XT show performance on par with nVidia's high-end cards. In our testing of this system, however, we saw some irregularities. In *3DMark05* Game 3, the dual Radeons squeaked past the record set by Falcon Northwest's SLI-equipped Mach V machine in February. Not a bad feat considering how shockingly fast the Mach V was. But the Radeons take a back seat to nVidia's dual-card solution in *Doom 3,* where its score of 109fps is a distant second to the Falcon's record 137.

Fortunately, there's good news elsewhere. The Omen scorched our *SYSmark2005* application test, blasting past the 300 mark, and setting a new record at 312. The Omen also broke the record in our Adobe *Photoshop CS* test. In the two remaining tests—our *Premiere Pro* and DivX Encoding test—the Omen didn't break any records, but it performed extremely well.

In the end, we're very intrigued by the Omen, but we have reservations. We're a little worried about the *Doom 3* numbers. It's not unusual for some games to run better on certain hardware, but a 28fps gap is abnormal. We just don't have the confidence yet in ATI's CrossFire scheme that we have in SLI systems yet. This is the first CrossFire system we've tested, and while we didn't have any major problems, we did see some oddly rendered shadows in certain games.

And then there's the price. The Voodoo costs a painful $7,500 which is good and bad. The bad is that it's $7,500, the good is that it's about $250 less than the Falcon Mach V we reviewed in February.

—GORDON MAH UNG

UNDER THE HOOD

BRAINS	
CPU	AMD Athlon 64 FX-60 (2.6GHz dual-core)
MOBO	ASUS A8R32-MVP Deluxe
RAM	2GB Corsair (two 1GB sticks)
LAN	Dual Gigabit LAN
HARD DRIVES	Four 150GB Raptors (10,000rpm SATA) in RAID 0
OPTICAL	Two Pioneer DVR-110D
BEAUTY	
VIDEOCARDS	Two ATI Radeon X1900 XT 512MB in CrossFire (689MHz core, 797MHz RAM)
SOUNDCARD	Sound Blaster X-Fi Xtreme Music
CASE	Custom
BOOT: 34 sec.	DOWN: 12 sec.

OMEN A:121 CROSSFIRE

VOODOO

Yummy FX-60 plus two X1900 XT cards equals happiness.

DOO DOO

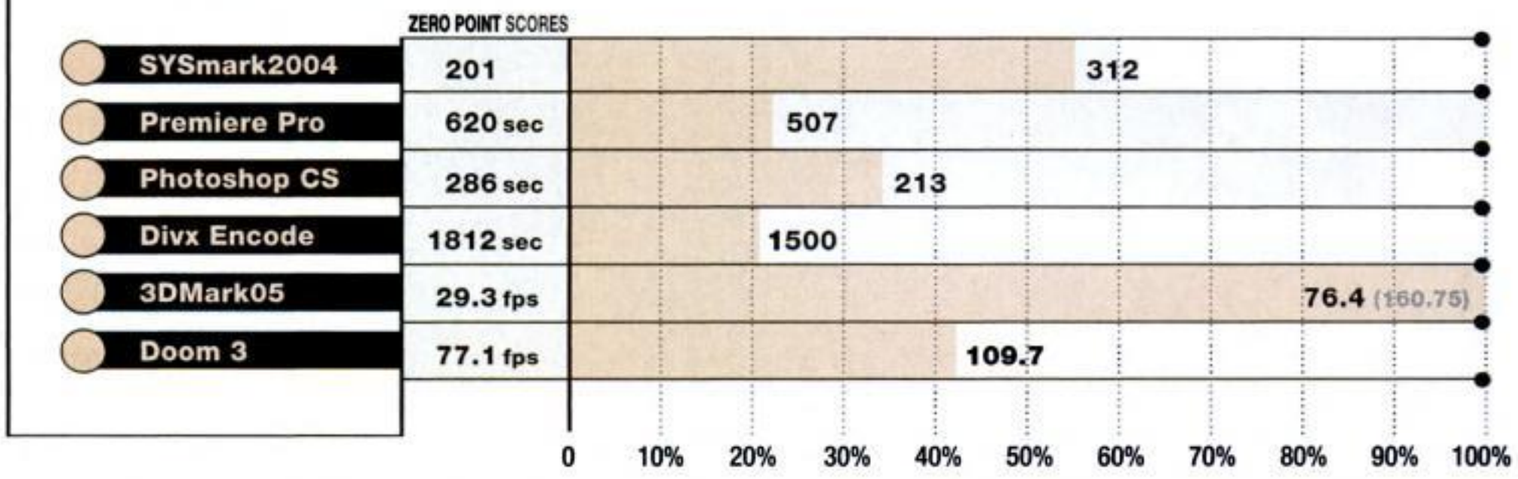
Expensive, with just fair OpenGL gaming performance.

9

MAXIMUM PC KICKASS

$7,500, www.voodoopc.com

BENCHMARKS



Our zero-point reference system uses a 2.6GHz Athlon 64 FX-55, 2GB of DDR400 Crucial Ballistix RAM, two nVidia GeForce 6800 Ultra cards in SLI, a Maxtor 250GB DiamondMax10, a Sound Blaster Audigy 2 ZS, a PC Power and Cooling TurboCool 510 Deluxe Express, and Windows XP Pro with SP2.

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Socket 939 Processor

AMD

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800MHz HT 128KB L2 Cache
Socket 754 Processor

MSI

$199.00

MSI K8N Diamond Plus Socket 939
NVIDIA nForce4 SLI X16 ATX For AMD

SAPPHIRE

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256MB GDDR3 PCI Express x16

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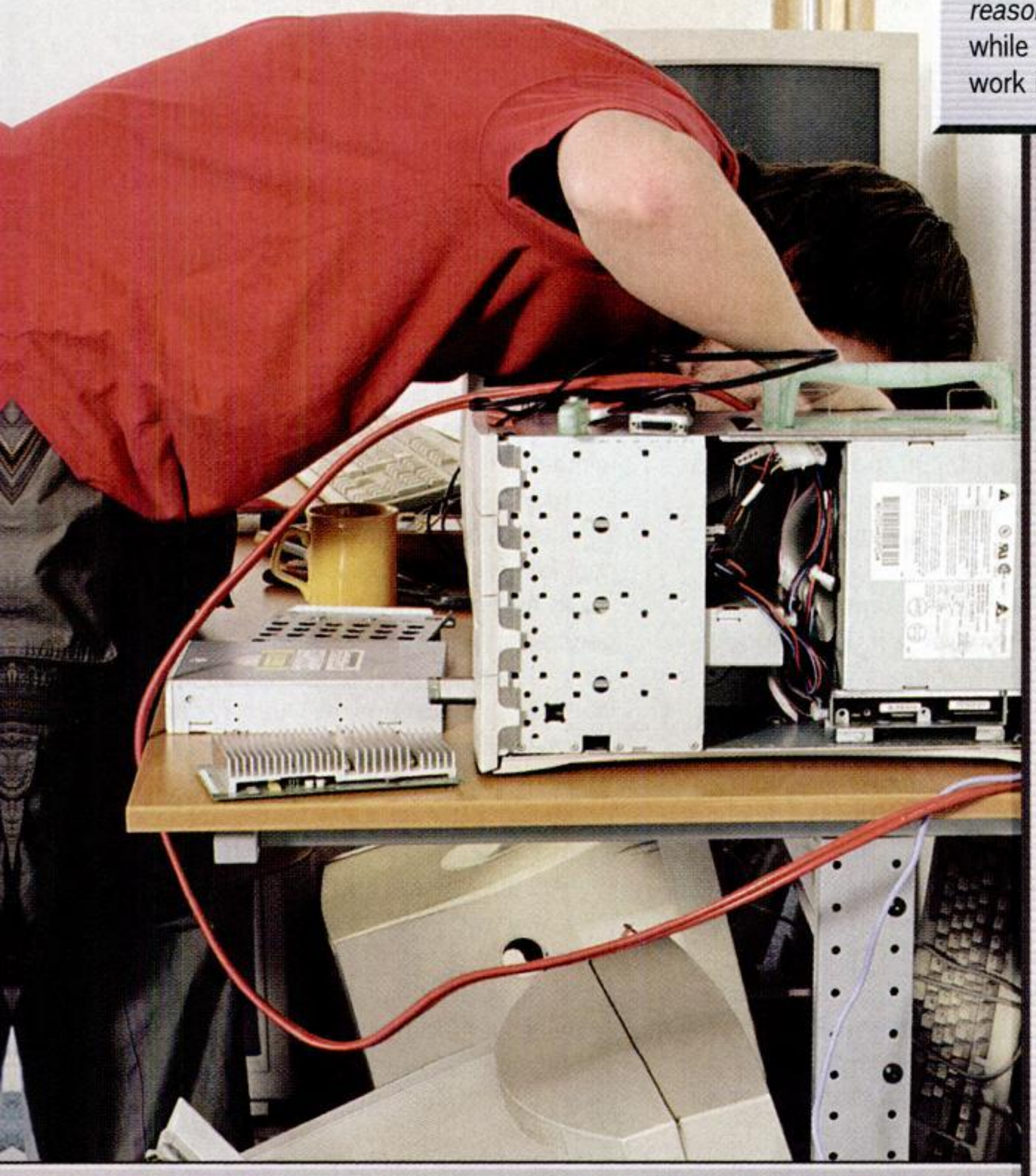
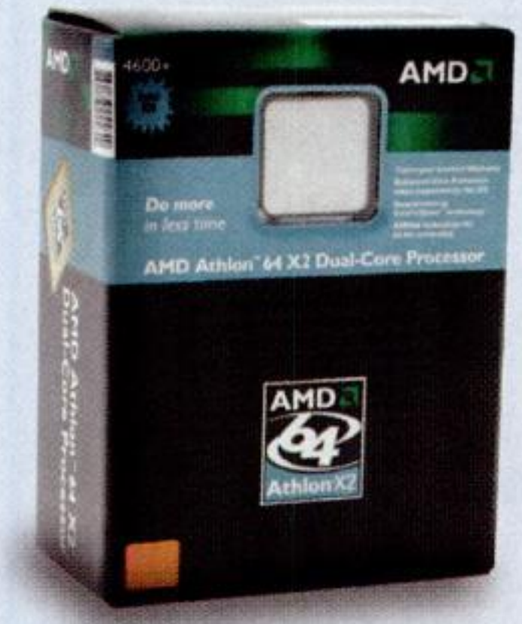


AMD

The FIRST Windows®-Compatible 64-bit PC Processor



$589.00

AMD Athlon™ 64 X2 4600+ Manchester 1GHz HT 2 x 512KB L2 Cache Socket 939 Dual Core Processor

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GOLD HONOREE BizRate 2005

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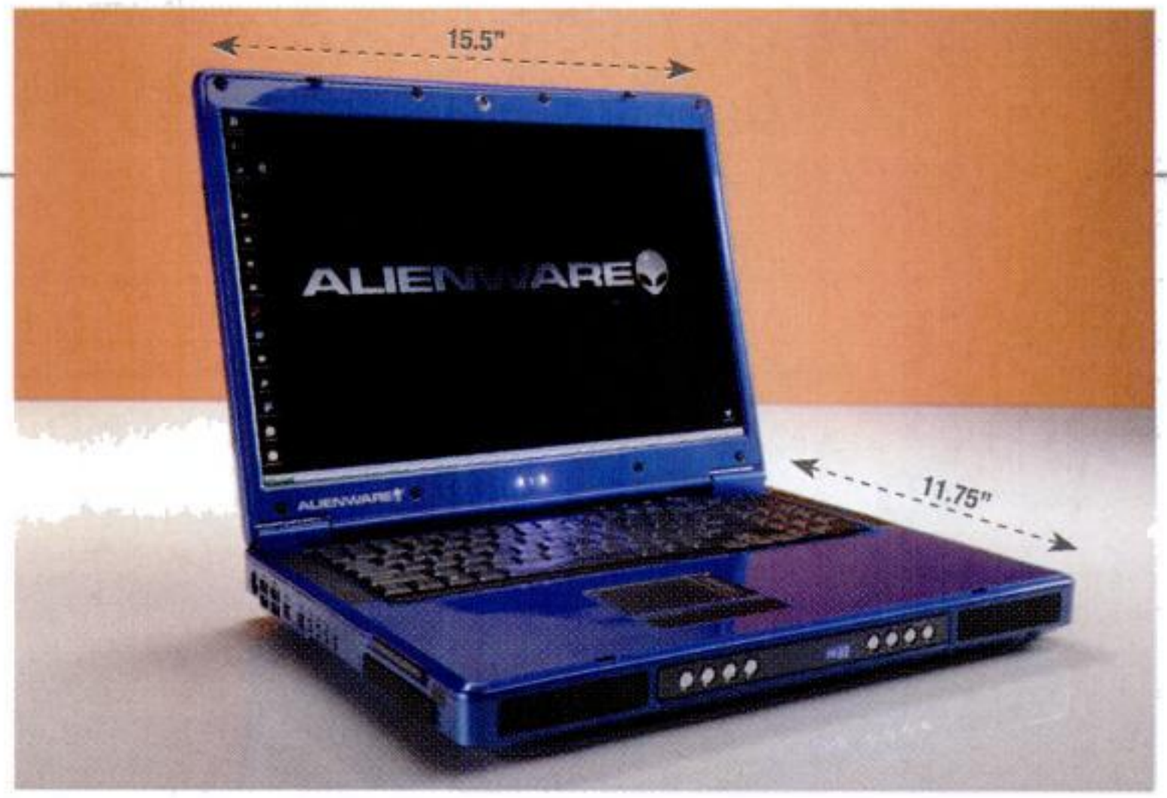
Alienware Aurora M7700

The power of Athlon 64 FX-60 compels you!



There's not much you *can't* do with the Aurora M7700, if you can heft it.

We've come to realize that there are two kinds of *Maximum PC* readers: The first is the standard Joe or Jane who has four desktop machines at home to do all the heavy lifting. For these users, a small, low-power notebook is more than sufficient.

Then there's the *Maximum PC* reader who wants to take everything with him—everywhere. For that user, Alienware's new Aurora M7700 fits the bill. Using the familiar Clevo D-series chassis that we've seen from various vendors, the M7700's main difference is on the inside. Alienware ditches the thermo-nuclear Pentium 4 for a dual-core Athlon 64 FX-60.

For those who don't follow the model numbers, that's two 2.6GHz cores, each with 1MB of L2 cache and an on-die memory controller. That combined with a GeForce Go 7800 GTX puts the M7700 at the top of the heap for portable gaming performance. But you'll get more than good gaming from the M7700. We recently ran into trouble editing a video project using an older notebook. Although the notebook had a respectable processor, the GPU was simply too feeble for the task. It rendered all of our previews as soft, down-sampled mush. And such slowdowns aren't isolated to video editing. As more applications begin leaning on the GPU, you'll need more power than is offered by onboard or last-gen graphics parts. With a 24-pixel pipeline GPU that supports Shader Model 3.0, the M7700 is up to *all* of today's graphics challenges.

In our performance benchmarks, the M7700 hit 65fps in *Doom 3.* Only the Voodoo Envy Hu:703 that we reviewed in December was close, with a score that was a tick faster. The M7700 topped all others in our *3DMark05* test, scoring 6,798.The FX-60 also did well in our multithreaded *Premiere Pro* benchmark—with a score of 595—but not well enough to beat the Intel-powered competition. The Voodoo's 3.8GHz Pentium 4, for example finished our *Premiere* test in 487 seconds, while the dual-core Core Duo Dell notebook, reviewed last month, hit 502 seconds.

The tables are turned, however, when you shift to *Photoshop CS.* The Athlon 64 has long been the fastest CPU in this app, and, indeed, the M7700 finished our test in 274 seconds, versus 355 seconds for the P4-equipped Voodoo. The M7700 also blew away the rest of the pack in hard drive I/O. Its RAID 0 array, which uses two Hitachi 7,200rpm drives, spits out average read speeds of 72MB/s—more than double that of our zero-point notebook. Notebook hard drive access has always been a weak point, but not with the M7700. Our only fear is its reliance on RAID 0. Lose a disk and you've lost the contents of both drives. But the fact is there's no way to get respectable read and write speeds in a notebook today without using RAID 0. Just make sure you run regular backups.

Where the M7700 did better than expected was in battery run-down time. To test the battery, we loop *3DMark03* until it goes dry. We expected the M7700 to drink power like a four-barrel carburetor guzzling Super Unleaded. But the M7700 gave us a run time of roughly 75 minutes—about 20 minutes longer than the Voodoo Envy, and just a few minutes shy of the Dell E1705 we reviewed last month. Not great, but when you expect 20 minutes of battery life, anything over an hour is a pleasant surprise.

At nearly 13 pounds, this notebook is only portable for weight lifters. If you're willing to carry the weight, you get the benefit of a beautiful 17-inch UXGA+ panel. Our only gripes with the M7700 concern the slight bulge of the keyboard and a lack of ExpressCard support. We're also a little confused by the optical configuration, which includes a DVD burner and a CD-RW drive. That's so 2001.

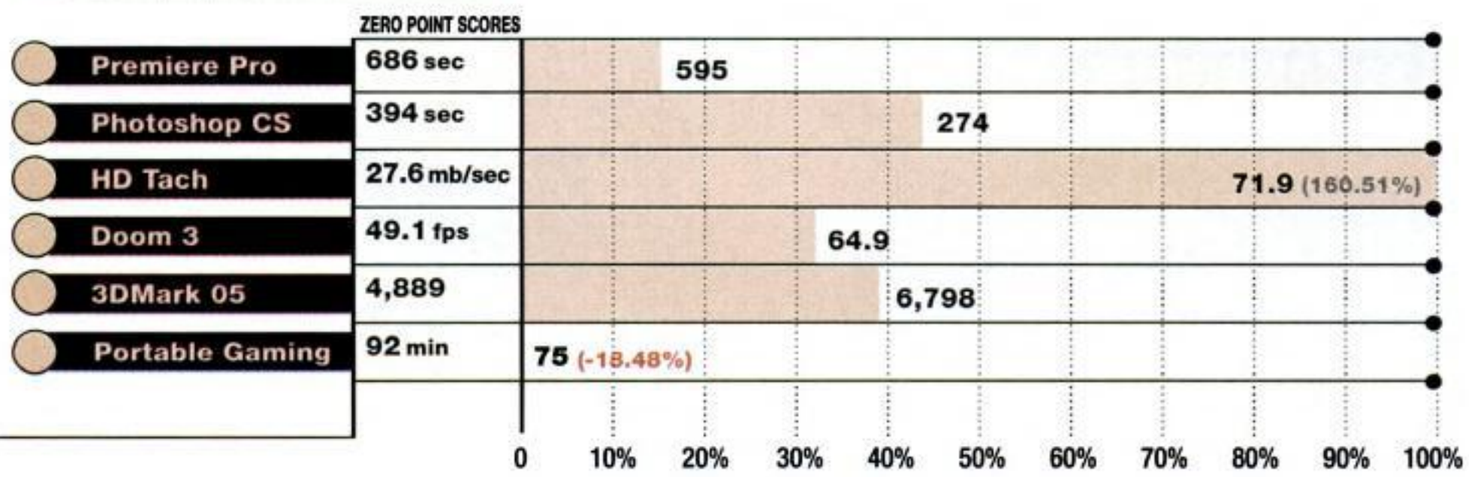
If you're looking for a truly portable notebook, this ain't it. The M7700 is a superpowerful notebook that'll do 99 percent of everything you can do on a desktop, with muscle to spare.

—GORDON MAH UNG

UNDER THE HOOD

BRAINS	
CPU	AMD 2.6GHz Athlon 64 FX-60 (using VIA K8T890CE)
RAM	2GB DDR400
LAN	Atheros Wi-Fi A/B/G, Bluetooth, Gigabit Ethernet, modem
HARD DRIVES	Two 80GB Hitachi 7,200rpm TravelStars in RAID 0
OPTICAL	NEC ND-6550A, Matshita CW-8124
BEAUTY	
VIDEO	nVidia GeForce Go 7800 256MB (250MHz core / 658MHz DDR)
DISPLAY	17-inch (1920x1200@32-bit)
AUDIO CHIP	RealTek AC97
LAP WEIGHT	12.9 lbs
CARRY WEIGHT	15.4 lbs
BOOT: 47 sec.	DOWN: 13 sec.

BENCHMARKS



Our zero point is a Dell Inspiron XPS, with a 2.13GHz Pentium M, 1GB of DDR2/533 RAM, and a GeForce Go 6800 Ultra.

ALIENWARE AURORA M7700

GLOBE TROTTERS

Athlon 64 FX-60 in a notebook!

GLOBAL SQUATTERS

It's 13 frakking pounds! And it lacks support for ExpressCard.

9

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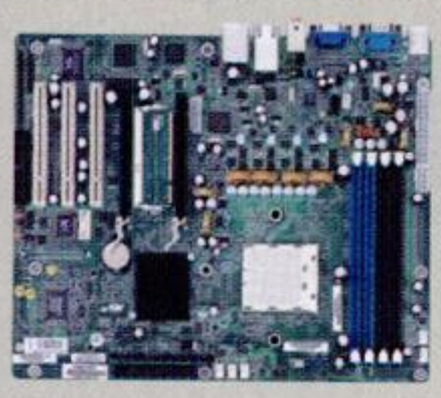

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- Dual IEEE 1394a ports via cable
- Integrated 2D/3D PCI Graphics

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Maxtor One Touch III Turbo

One terabyte and RAID with all the fixins

With connectors for FireWire 400, FireWire 800, and USB 2.0, the One Touch III Turbo will work with any PC or Mac.

Backup drives are usually pretty bland and uninteresting, consisting of just a drive mounted inside a plastic shell. Not this time! Maxtor has managed to tickle our Geek-spot by wedging two 500GB drives inside a sexy rubber lunchbox, and adding a dash of RAID for spice. It all amounts to one hell of a drive, and it's the new end-all, be-all backup drive as far as we're concerned.

The Turbo's small footprint belies its behemoth capacity, which totals 930GB formatted, compliments of two Maxtor DiamondMax 11 500GB drives. While having two drives instead of one isn't *that* exciting on its own, we were stoked to learn that you can run the drives in either RAID 0 (striped) for maximum capacity, or RAID 1 (mirrored) for redundancy. You set up the array using the included software, which we found extremely easy to use. Note that if you run RAID 1, there's no way to swap out a drive in the event of a disk failure. Maxtor will send you a new unit, to which you would copy your data, and then you'd return the defective unit to Maxtor.

The Turbo's configuration utility sports some options we *love*—such as the ability to password-protect access to the drive in case of theft, the option to reduce seek times for quieter operation (although you can't adjust the integrated fan's speed), and the ability to easily tell the drives to spin down after a certain period of time.

The included backup software is Dantz *Retrospect*, but Maxtor has added a custom front-end that makes the software simple to use. You can make images of your drives, duplicate key files, or just keep certain folders synced with your backup drive at all times.

We're impressed. Way impressed. If Maxtor added a media reader, a USB port, and silenced the fan, this drive would have been worthy of a Kick Ass award.

—JOSH NOREM

MAXTOR ONE TOUCH **9**

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Kodak EasyShare One

It's an interesting idea, but not all that easy

The EasyShare One has robust Wi-Fi capabilities, but it's overpriced and not necessarily easy to use.

Wireless is the new tech race in the compact digital camera field, and Kodak was first out of the Wi-Fi gate with the EasyShare One. This 4 megapixel "compact" camera has 802.11b connectivity that not only lets you print your images wirelessly but also share them on the web.

Kodak calls its Wi-Fi "integrated," but it requires you to use a separate wireless card (included) that you insert in the top of the camera much like an SD card (same formfactor). You press the top of the card, causing it to pop up, to turn on Wi-Fi. You can then email pics to friends or upload them to the Kodak EasyShare Gallery—where others may view and print them—using your Wi-Fi network at home or some other hotspot. You can also show people your online gallery of pics on the camera's swiveling 3-inch LCD touch-screen. (The camera comes with a stylus, allowing you to navigate its menus just like a PDA.)

The stylus and graphical menu make it simple to browse and organize your pics (you can even crop pics in-camera and save the results). However, enabling the full wireless capabilities inevitably involves messing around with WEP keys and can involve quite a bit of trial and error (plus, using Wi-Fi severely drains the battery). We had trouble getting our test unit to work with our wireless network at home until we switched from a shared-WEP key to an open key, which was not specified in the instructions.

Wi-Fi aside, don't let the 4 megapixel rating fool you: This camera takes very nice photos, particularly outdoors. Unfortunately, the video quality is sub-par. Performance-wise, the EasyShare One is a slow starter and is heavier and bulkier than most other 4 megapixel cameras.

If you must have wireless, the EasyShare One is the only game in town—for now. However, it's still nearly twice as expensive as more full-featured non-wireless cameras with higher resolution capabilities, and we'd really love to see the ability to upload files to other photo-sharing services or a simple FTP site in a future revision.

—STEVE KLETT

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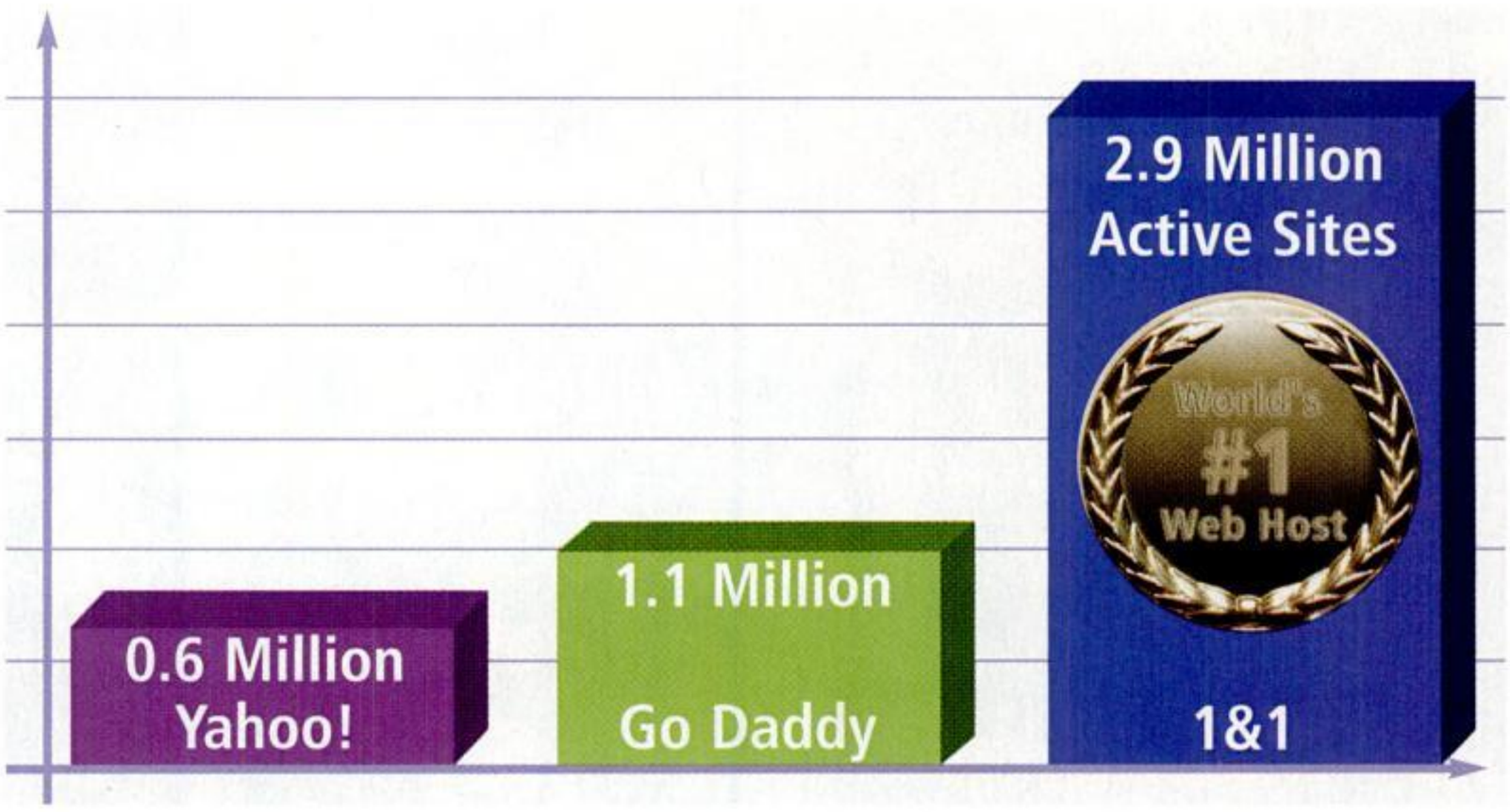

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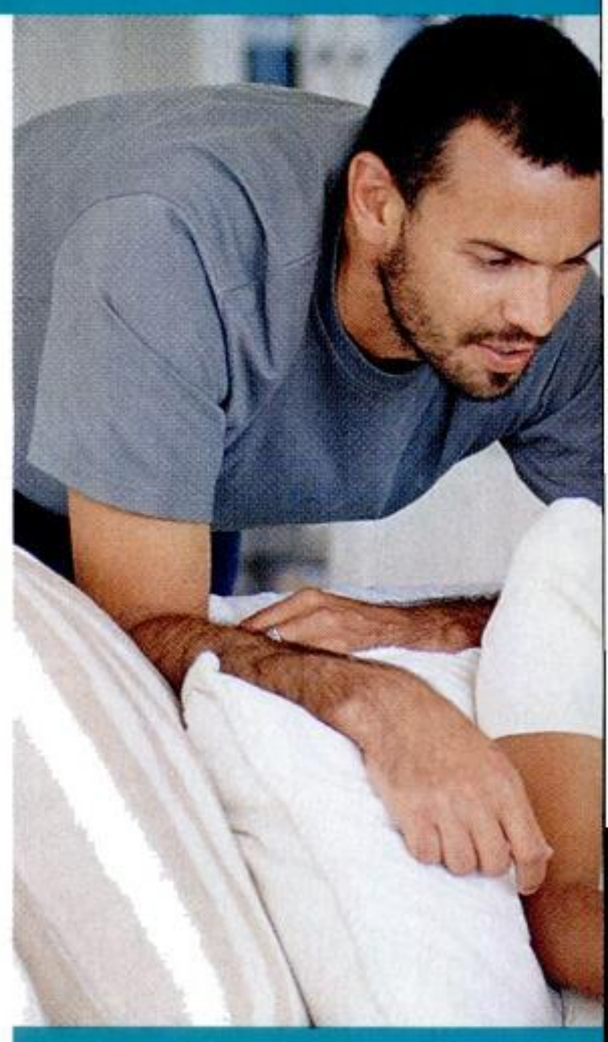

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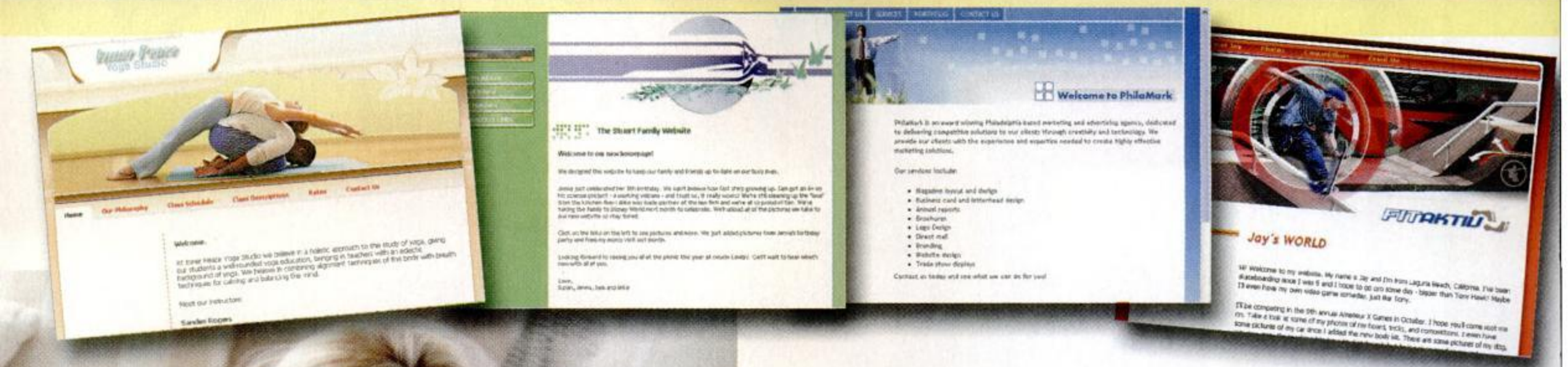

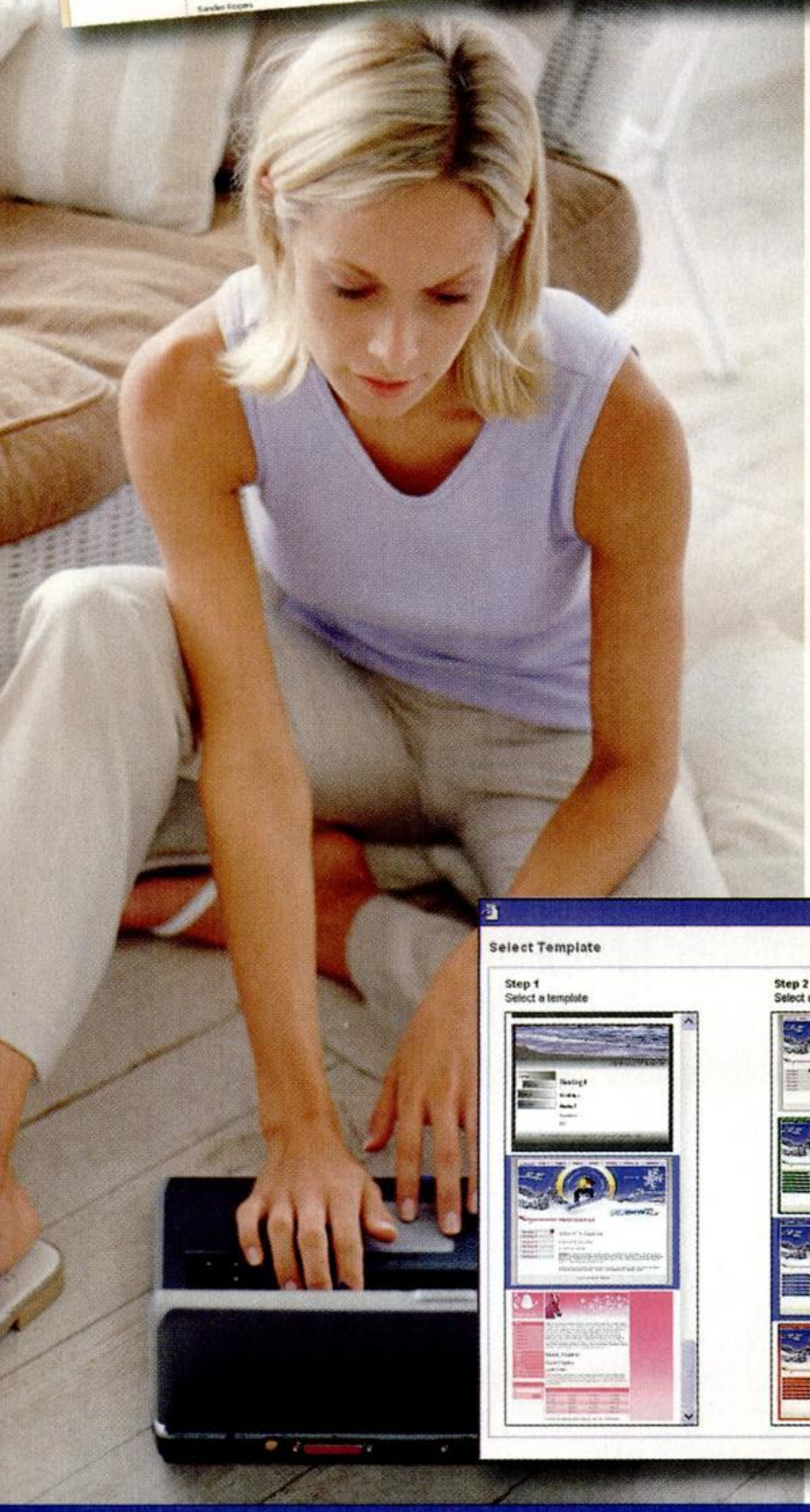

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Database	10 MySQL (Linux)	10 MySQL (Linux)
Search Engine Tools	✓	$29.95/year additional
PHP Support (Linux)	✓	✓
90-day Money Back Guarantee	✓	–
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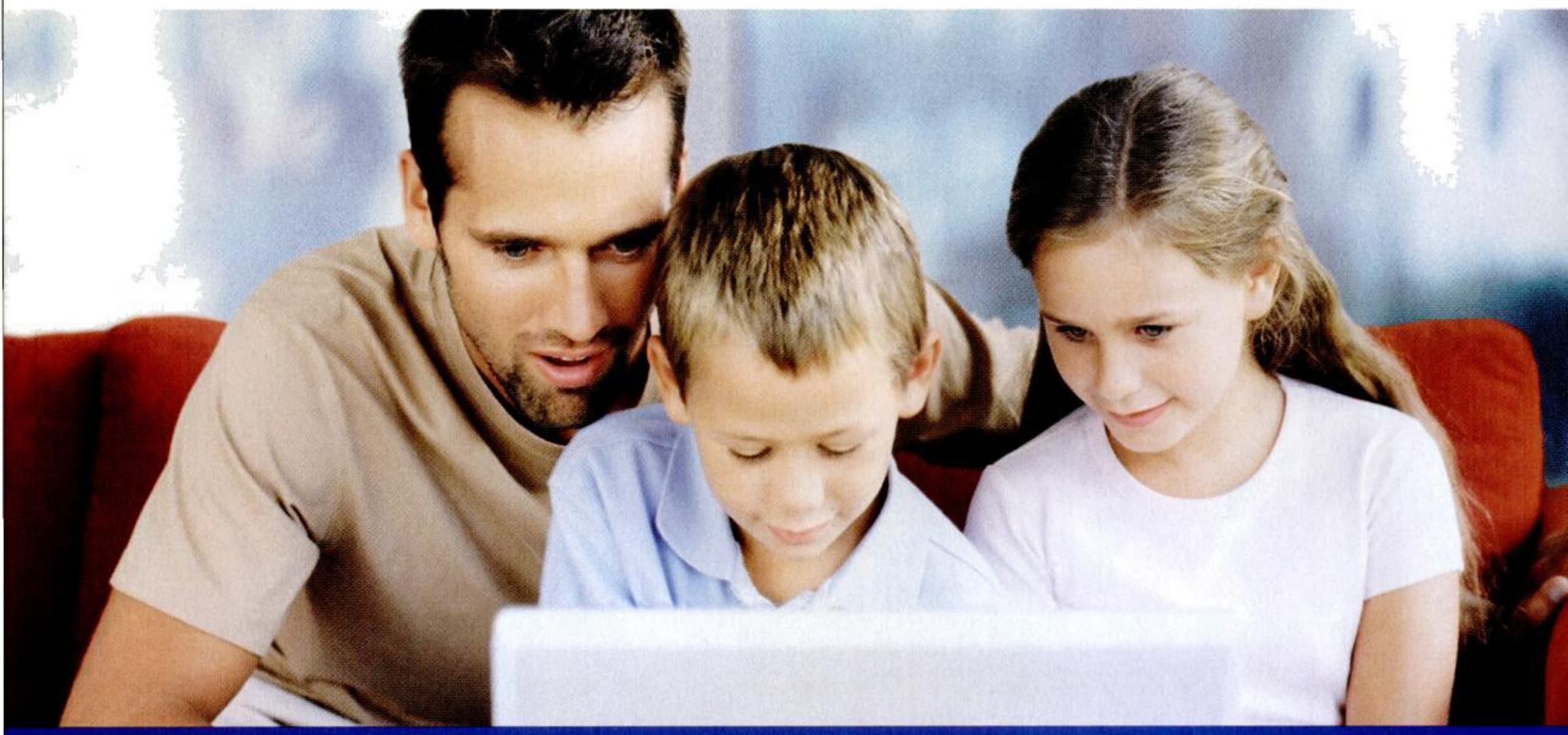

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Mailbox Size	2,000 MB	2,000 MB	10 MB
Website Builder	12 pages	✓	Freeware
Photo Gallery	✓	✓	✓
Dynamic Web Content	✓	✓	–
Web Statistics	✓	✓	✓
Chat Channels	✓	–	✓
Database	25 MySQL (Linux)	MySQL support	25 MySQL (Linux)
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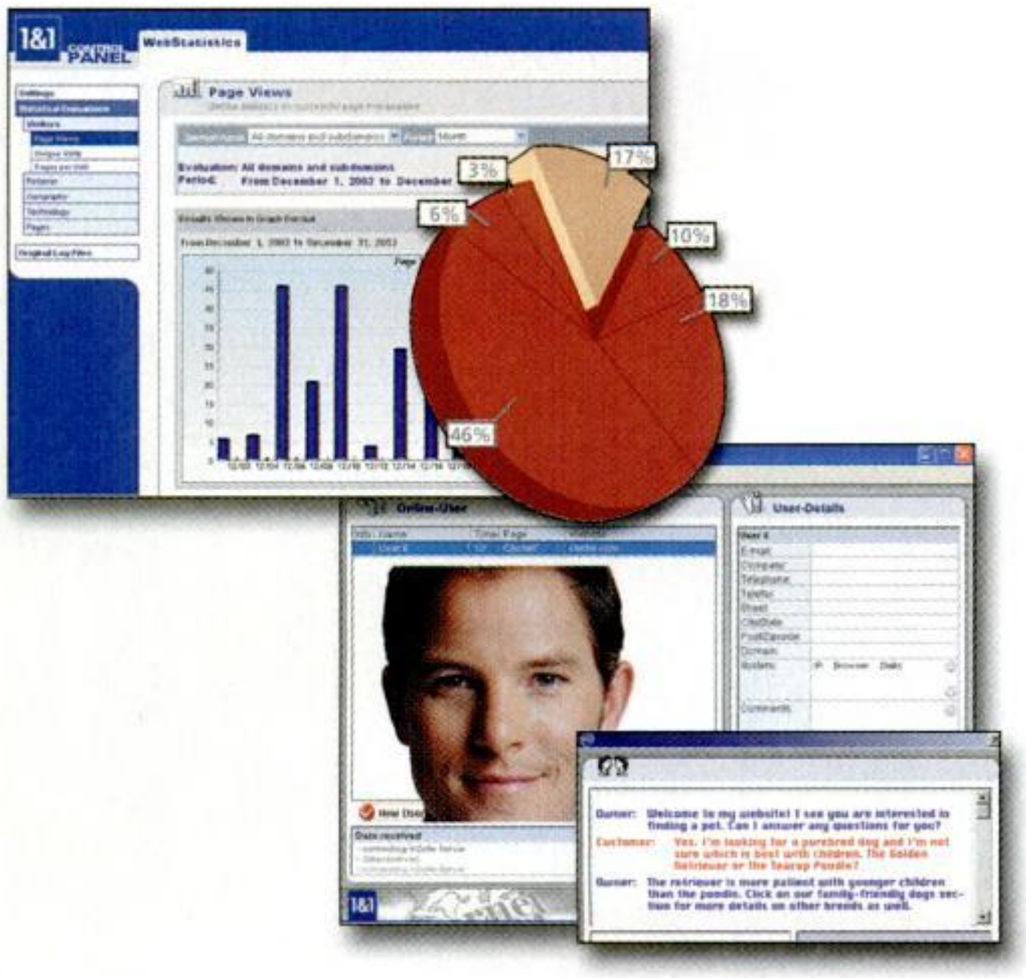

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Web Statistics	✓	✓	✓
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In2site Live Dialogue	✓	–	–
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Form Builder	✓	✓	–
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Software suite ($600 value)	✓	–	–
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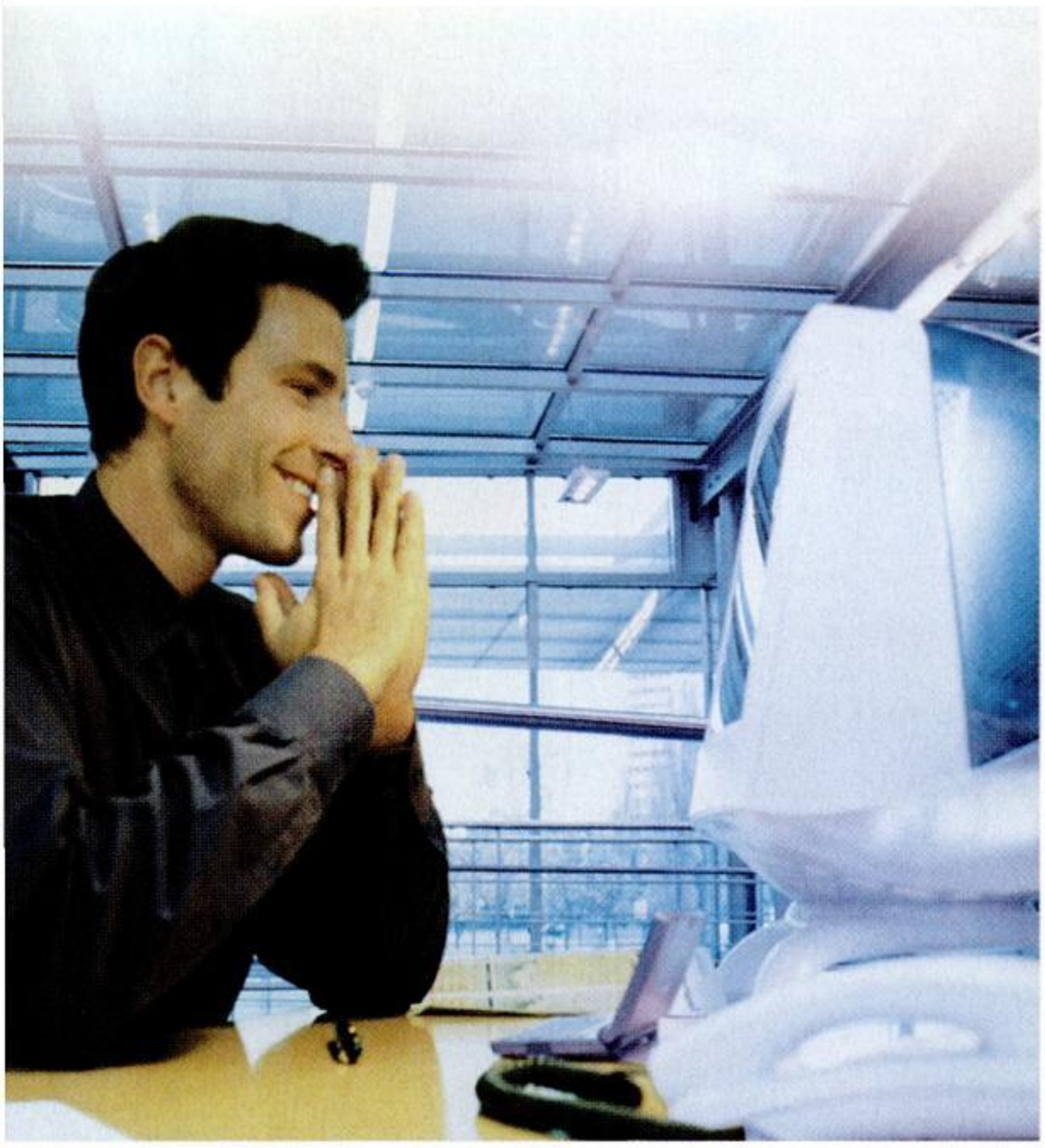

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Andreas Gauger, Chairman of the Board

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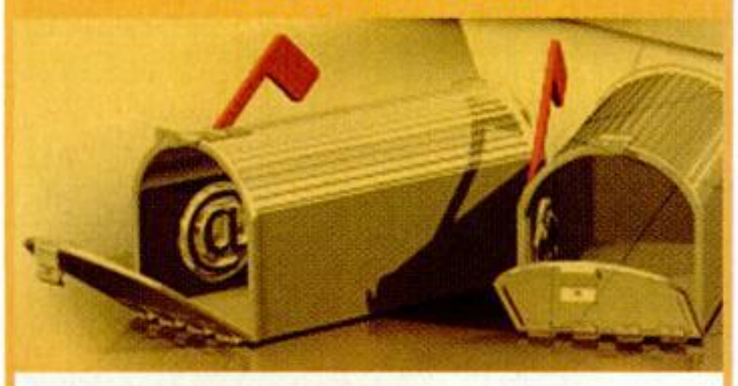

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Sony LocationFree TV LF-X11

The ultimate toy for TV junkies

The LCD component of Sony's LocationFree TV has "Home" and "On the Go" modes, so you don't need to reconfigure it for use on your home network after using it at a wireless hotspot or via a LAN cable in your hotel room.

Sling Media's Slingbox has generated mucho buzz with its ability to let you watch TV anywhere you have access to your network or the Internet. The latest incarnation of Sony's LocationFree TV, model LF-X11, does the Slingbox one better: It comes with a 12.1-inch, battery-powered, Wi-Fi enabled, touch-screen LCD.

As with the Slingbox, you can connect LocationFree TV to a set-top box, DVR, DVD player, or any similar device and stream audio and video output over your home network (in MPEG-2 format) or over the Internet (in MPEG-4 format) to any online PC. And like the Slingbox, you can use its built-in analog tuner to watch TV, or you can control remote devices by sending commands back over the network to an infrared blaster.

But where the Slingbox provides just one composite-video input and one pair of stereo audio inputs, LocationFree TV's base station is equipped with two of each (unfortunately, it lamely matches the Slingbox by having just one S-Video input.) And Sony's infrared blaster can control two devices, using independent onscreen remote controls. You'd have to buy two Slingboxes to pull that off.

LocationFree TV's base station can also operate as an 802.11a/b/g wireless access point, and it can stream audio and video to a handheld PSP. The Slingbox can't do either. We don't mean to beat up on the Slingbox, but the two devices do invite comparison. And for that matter, the Slingbox has a few of its own advantages: You can install *its* player software on as many PCs as you like (Sony stupidly expects you to pay $30 for each PC after the first); it should soon support Microsoft's *Windows Mobile*, enabling you to watch TV on a whole mess of handheld devices *other* than the PSP; and it costs about $100 less than the LocationFree Player Pak (which sells for $350 and doesn't include the display).

But let's get back to the LocationFree TV's wicked-cool LCD, which is practically a thin-client PC. While it's no substitute for a laptop, it does have a convenient handle, a built-in stand with 120-degrees of movement, a wired Ethernet port, a Memory Stick port, and a USB 1.1 port (that Sony has unfortunately crippled so that it recognizes only USB keyboards).

You use a stylus on the touch screen to navigate a basic operating system, tab-based web browser, email client, drawing program, and onscreen remote controls. The software is highly integrated: You can capture anything displayed on the screen, load it (or any other digital image) into the drawing program, edit and annotate it, and then attach it to an email and send it over your network.

We were amazed to discover that we could teach the LocationFree's IR blasters to emulate any other remote simply by pointing the remote at the LCD and mapping its buttons using the stylus and touch screen. Good thing, too, because the device's firmware harbors a skimpy collection of preprogrammed codes.

The 800x600 LCD is bright and lusciously vibrant, even when viewed off axis. With the backlight at maximum, we managed to squeeze out two hours and one minute of use with the software, watching live TV and streaming content from our DVR. You can stretch the battery by dimming the backlight; a spare battery will set you back a princely $150. Wireless range was surprisingly good: We enjoyed reception in every location inside a three-bedroom, 1,800-square-foot home and were able to wander up to 50 feet out into the yard.

If all you're looking for is a device for streaming video over the Internet, you don't need a Wi-Fi access point, and you don't care about the LCD or streaming video to a PSP, the cheaper Slingbox is a better value. But if you want the ultimate streaming-TV solution, there's nothing quite like the LocationFree TV's portable display.

—MICHAEL BROWN

SONY LOCATIONFREE TV LF-X11

+ STREAMING VIDEO

Very cool, portable LCD; streams video to a PSP; excellent wireless range.

9

– STREAMING TOXINS

Software requires a separate license for each PC; limited collection of remote-control codes.

$1,500, www.sony.com

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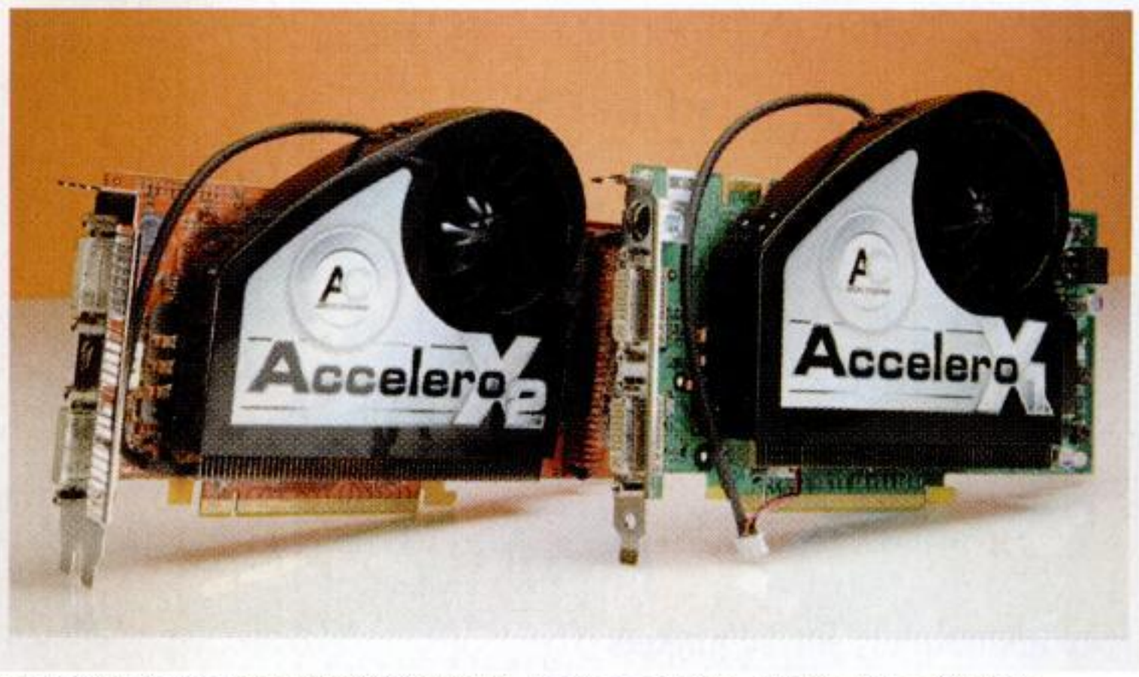
Arctic Cooling Accelero VGA Coolers

Cool and quiet, just the way we like it

Arctic Cooling has retired its Silencer series of VGA coolers, reportedly because their massive size was causing worldwide plastic shortages (we kid, but they were huge coolers). To replace the Silencer, Arctic Cooling just introduced the Accelero X1 (for nVidia cards) and X2 (for ATI cards). We didn't like the Silencer coolers, but the Accelero is a fantastic product by any measure. Both flavors of cooler are silent in operation, easy to install, and deliver more cooling power than any stock unit we've tested.

The Accelero's design is simple. Underneath the plastic shroud lies an aluminum heatsink roughly the same size as the Asian land mass. It sports six heat pipes that transfer heat from the GPU core into the fins of the heatsink. A small, silent 2,000rpm fan blows air over the heatsink. Though the previous-generation Silencer coolers used a large duct to exhaust the warm air from the cooler to the outside of the case, the Accelero only circulates air inside the case. Some might think this is a pity, but the performance didn't suffer, so we're not complaining. The cooling shroud even features a special tab that directs cool air from the fan to the voltage regulators at the rear of the board, which is useful and appreciated.



The X2 is for ATI X1800/1900-series cards, while the X1 fits nVidia 6800/7800 boards.

BENCHMARKS

	6800 GT STOCK	6800 GT ACCELERO	X1800 XT STOCK	X1800 XT ACCELERO
IDLE (C)	60	**46**	60	**52**
LOAD (C)	85	**56**	84	**72**

Best scores are bolded. All temperatures were measured via the onboard sensors, using the utilities provided by the motherboard manufacturer. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved running CPU Burn-in for one hour.

Installation is simple and takes about five minutes. The unit comes with thermal grease preinstalled, so once you've removed the stock unit's cooling apparatus, you just drop the Accelero onto your VGA board and secure it with the provided screws and washers.

During testing, the numbers were fairly impressive, especially on the nVidia board. But what the numbers don't tell you is that this cooler makes no noise whatsoever. Even when we put our ear next to the cooler, we couldn't hear it.

So, let's recap: The Accelero provides excellent cooling, runs silent, is easy to install, and affordable. Sounds like a perfect 10 to us.

ACCELERO VGA COOLER **10**

$33, www.artic-cooling.com

MAXIMUM PC KICKASS

—JOSH NOREM

Netgear XE104

85Mb/s? We don't see no stinkin' 85Mb/s!

Powerline networking that delivers 85 megabits per second sounded too good to be true when we first heard about it. To think of all the things we could do with that kind of bandwidth! The possibilities for video-streaming alone were enough to get us salivating. Unfortunately, not only did Netgear's XE104 fail to deliver on its bandwidth promises, it also had problems passing common packet types.

Powerline networking seems like the perfect panacea for anyone who's tried to stream video over Wi-Fi, because it lets you avoid the nasty signal drops that can plague wireless connections. Powerline adapters plug directly into your wall sockets and should, in theory, carry your data from room to room using your home's electrical wiring. While powerline tech has always worked, it's never been fast enough to handle a video signal, and sometimes even has problems streaming music.

To test bandwidth on such a device, we set up an FTP server on a local desktop machine, then connect to it wirelessly and download a large, heavily compressed 232MB file. With the adapters plugged into two rooms in a recently remodeled home, we could muster just 124KB/s. That was significantly slower than we expected, so we plugged both adapters into outlets in the same room, on the same circuit, but experienced the exact same result. We thought it might be the wiring in our test house, so we plugged both adapters directly into the same extension cord, and thought we'd found success, as Netgear's connection-monitoring app reported a full-speed connection. Unfortunately, when we ran the actual file transfer test, the result was almost the same as before: 150KB/s. This level of performance is simply unacceptable, and is slower than our broadband connection to the Internet!

Thanks to transfer rates that are slower than broadband, and the inability to pass UPNP packets, we're declaring Netgear's XE104 powerline network adapter a lemon.

We also encountered problems using Universal Plug and Play devices across the powerline portion of the network. That means that many streaming boxes—including any Windows Media Center Extender and any device that uses UPNP—can't connect across the powerline link. Of course, this would matter much more if we could get a fast enough link to stream video between two XE104s. As it stands, you should simply avoid the product at all costs.

—WILL SMITH

NETGEAR XE104 **1**

$90, www.netgear.com

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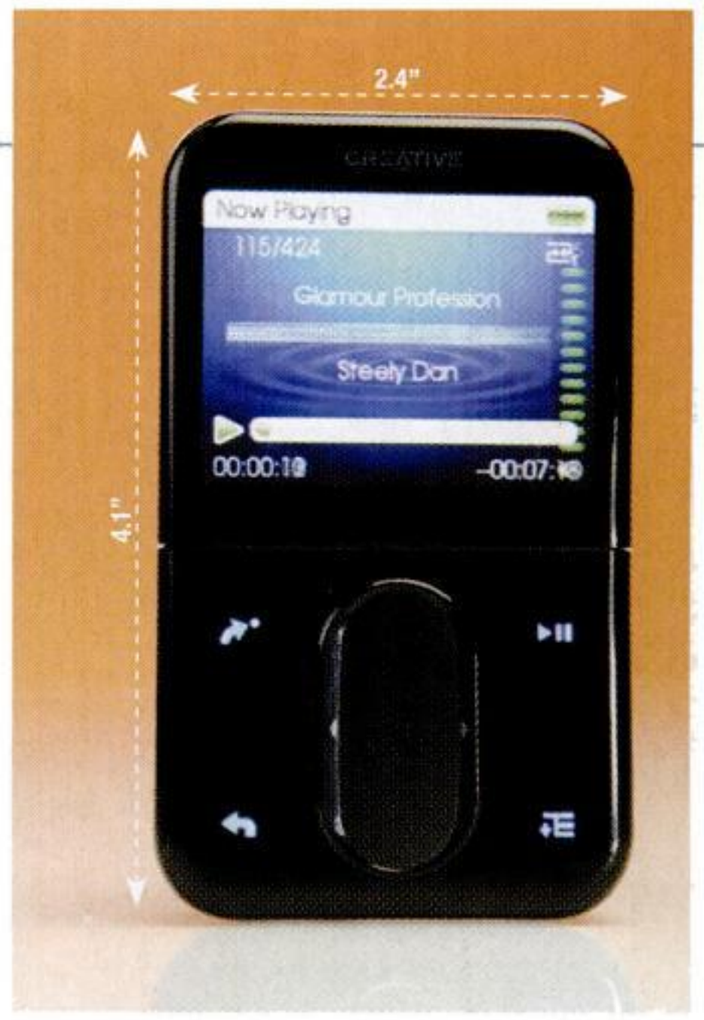
Creative Zen Vision: M

Heroin chic this video player is not

Creative's Zen Vision: M is a marvelous media player that just happens to be a little thick about the middle.



You know a device has a great user interface when someone utterly unfamiliar with it accomplishes a task within 10 seconds of picking it up. Apple's iPods pass this test with aplomb; Creative's Zen Vision: M utterly fails it. It's a significant flaw in an otherwise terrific media player.

Only one of the eight illuminated buttons adorning the player's face offers a clue to its function: the play/pause toggle. You'll need the manual to figure out everything else, but the research is worth the effort. Like Apple's fifth-generation iPod, Creative's latest player is equipped with a 30GB hard drive and a drop-dead gorgeous 2.5-inch backlit LCD (320x240 resolution). But where the iPod reminds us of Kate Moss, the Zen Vision: M stirs visions of Kirstie Alley.

Creative two-ups Apple by building in an FM radio tuner and a voice recorder, but it's a large battery that accounts for the sealed case's expansive girth, not these minor features. We nevertheless managed to squeeze out a scant 8.5 hours of combined audio and video playback time.

User interface and physiology aside, the M delivers awesome sound and video. The included earbuds are better than mediocre, but it took Shure's superior E4g earbuds to expose this player's excellent dynamic range. The screen is equally as good, even when viewed off axis. We're less enthused with the player's click-clack buttons, its hyper-sensitive touch pad, and the screen's susceptibility to scuffs (Creative provides only a cheap cloth pouch for in-transit protection). Charging or synching requires plugging in the included mini-port, which has connections for USB; an included A/C adapter; and (boo! hiss!) a *not*-included, proprietary, $19 A/V cable.

The Zen Vision: M is a superb choice if you're into video and all-you-can-eat, music-to-go services such as Rhapsody and Napster: It sounds and looks every bit as good as the video iPod, even if it isn't as sexy. Fashionistas and iTunes addicts, on the other hand, should stick with Apple.

—MICHAEL BROWN

SPECS

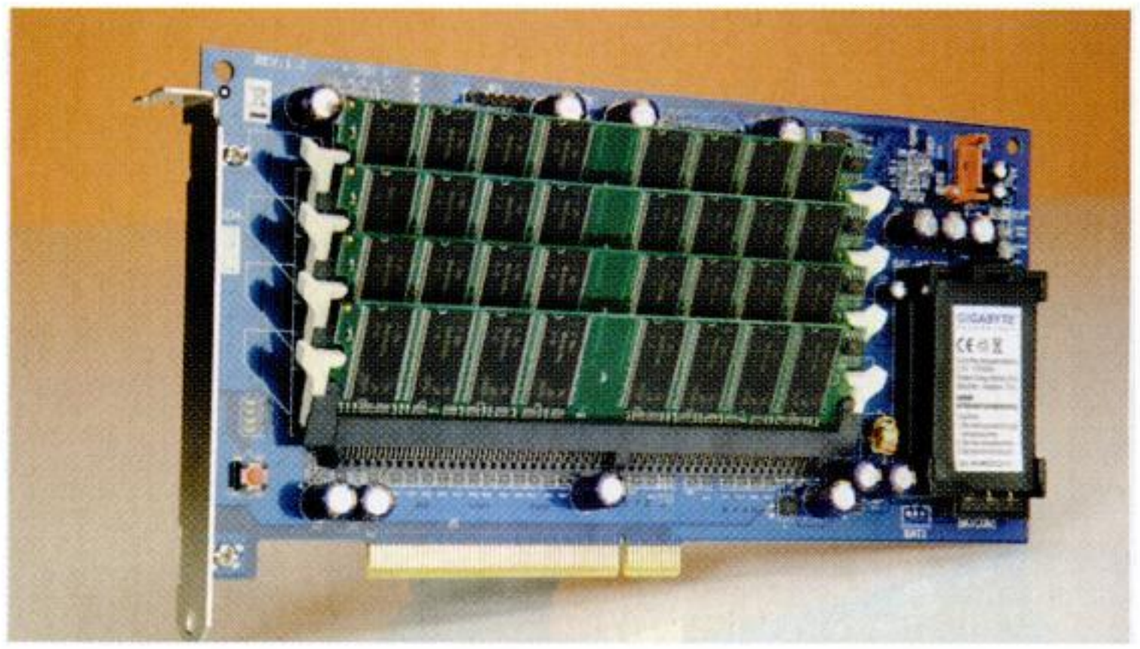
AUDIO FORMATS	MP3 and WMA, encrypted WMA (PlaysForSure), WMA, and FM radio
VIDEO FORMATS	Divx 4 and 5; Xvid 5; MPEG-1, -2, and -4 SP; MJPEG, WMV 9, and Tivo-to-Go
PHOTO FORMATS	BMP, GIF, JPEG, and TIFF

CREATIVE ZEN VISION: M **8**

$330, www.creative.com

Gigabyte i-RAM

And you thought a Raptor was fast



The i-RAM doesn't come with any memory—you'll need to supply your own. We used 4GB of Mushkin PC3200 for testing, and it worked brilliantly.

As seekers of all-out performance, it's only natural that we'd covet super-fast RAM for storage duties, but there have always been obstacles to this fantasy scenario. The first is cost, as RAM is crazy-expensive per gig compared with hard drives. Second, RAM is volatile memory: When it loses its electric charge all the data goes bye-bye, so if you put your OS on a RAM drive and then unplug the machine—D'oh! Simply put, RAM drives just aren't very practical. Still, the idea is intriguing, and Gigabyte's i-RAM actually works extremely well and overcomes the aforementioned obstacles, but we do have a few complaints.

The i-RAM card draws power from a PCI slot, but it actually pushes bits using SATA. It plugs into a SATA port and rides the SATA 150 interface—a real shame, as it totally saturates the channel. It would clearly benefit from the faster SATA 3G interface. The i-RAM ships without memory—you provide your own DDR modules, up to 1GB each. With four slots available, you can reach a maximum capacity of 4GB.

Gigabyte bypasses the volatility problem by including an onboard rechargeable battery, which charges whenever your PC is connected to a source of juice. If you unplug the PC, the i-RAM switches to the battery to keep the contents of the RAM from disappearing; the battery lasts 16 hours on a full charge.

The RAM drive is certainly fast, but it's not as fast as you might think. For instance, it still takes 24 seconds (versus 31 seconds using a Raptor) to load a level in *Doom 3,* and 33 seconds to boot (versus 41 seconds on the Raptor-equipped rig). Besides, the 4GB limitation is bunk. After installing Windows XP on this drive, we had only 322MB of free space. With many game installs topping 4GB, you couldn't even install a slow-loading game to this device.

If it held up to 8GB of memory and rode the SATA 3G interface, the i-RAM would earn a 10 verdict and a Kick Ass award. As it stands, it's a solid product that falls short of ludicrous excellence.

—JOSH NOREM

BENCHMARKS

	I-RAM	WD RAPTOR X
HD TACH 3		
RANDOM ACCESS TIME (MS)	**0.0**	8.2
BURST RATE (MB/S)	**141**	139
AVG. SEQUENTIAL READ (MB/S)	**131**	75
H2BENCHW		
APPLICATION INDEX*	**136.1**	40.1
OTHER		
DOOM 3 LOADING (SEC)	**24**	31
BOOT (SEC)	**33**	41

*Best scores are bolded. *The application index is a real-world script of six applications. The score is based on the time it takes the drive to complete the scripts.*

GIGABYTE I-RAM **9**

$150, www.gigabyte-usa.com

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2

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ALUMINUS

GAMING CASES

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A Tale of Two Towers

Delectable cases, from both sides of the tracks

Do you roll like a lottery-winning balla', or more like a college freshman working part-time at the Qwickie-Mart? Either way, we have a case for you this month. Both of these enclosures are dark, mysterious, and praiseworthy, despite the fact that you can buy five of one for the price of the other.

—JOSH NOREM

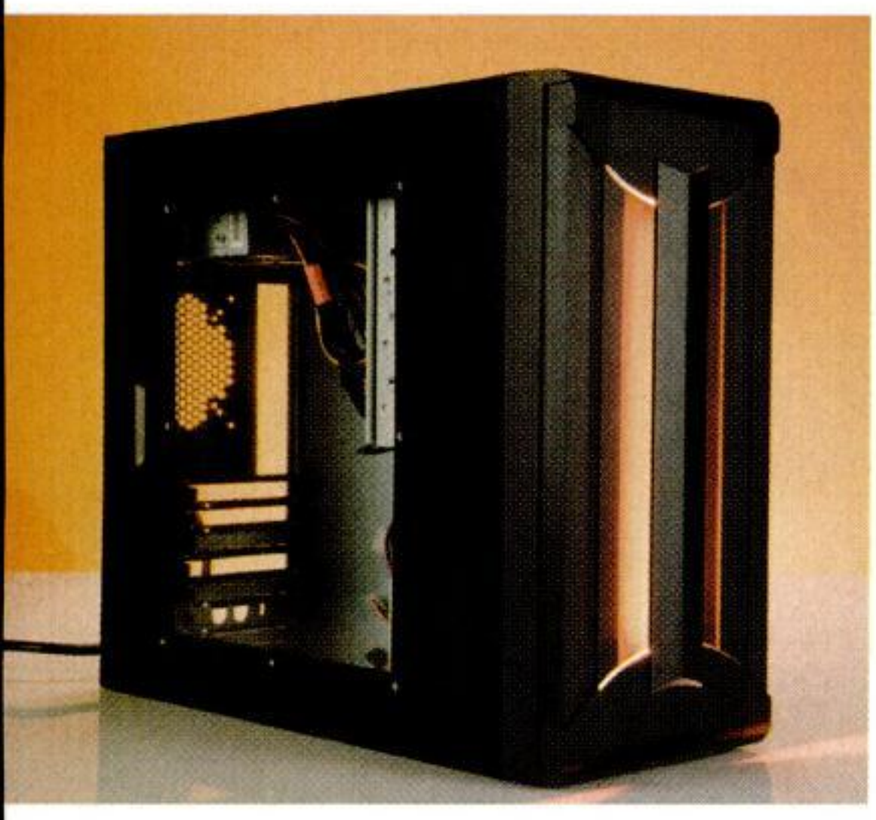
KINGWIN SK-523BKW

Don't let the uninspired name fool you: Kingwin's SK-523BKW is one of the best enclosures we've seen at this price. Thanks to its all-steel body and aluminum front bezel, the SK-523BKW is light yet feels sufficiently sturdy when you're working in it. The front bezel features a swing-out door that's bathed in the soft glow of an integrated red cold-cathode light. On the right side of the bezel, a small door flips open to reveal two USB ports and a single SATA port, which you can connect to a SATA port on your mobo using a pass-through cable. It's not useful now, but it could be if external SATA catches on.

The interior of the chassis is identical to the excellent Cooler Master Cavalier, with one exception: The three-drive hard drive cage is turned sideways, so the back of the drives face the side door, making drive swaps incredibly easy. Snap-on drive rails that are a snap—literally—make swapping disks even more effortless. Sliding levers lock optical drives into place, and PCI cards are secured via a nifty tool-less retention mechanism.

The included fans—two big, quiet 12cm jobbies—intake and exhaust more than enough air, and operate quietly to boot. You can even adjust the front fan's speed using a knob on the front bezel.

As far as we're concerned, the SK-523BKW's only flaw is its paint job. The flat black finish is much too scratch prone. A videocard we set on top of the case in the course of our tinkering might as well have been a feral cat, so severe were the resulting scratches.



In what will probably become a trend in the future, Kingwin includes a front-mounted SATA port along with USB.

KINGWIN SK-523BKW

+ COLD CATHODE
Good cooling, sleek design, and easy to build in.

– COLD CASSEROLE
Exterior scratches easily, and cold cathode light is bright.

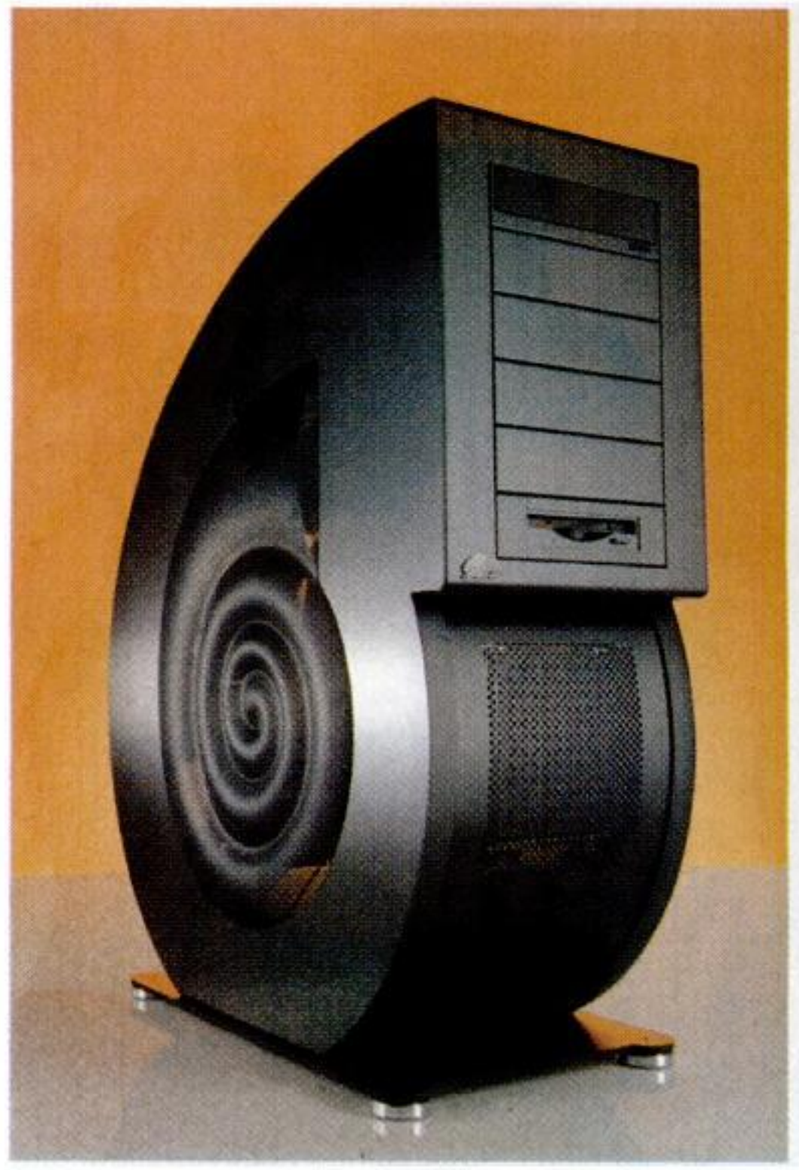
9

$55, www.kingwin.com

LIAN LI PC-777 MEMORIAL EDITION

We were initially taken aback by the PC-777's unusual snail-shell design—an aluminum representation of Lian Li's corporate logo. But we have to admit that it's grown on us, especially the black version, which we reviewed (silver is also an option). Regardless of where you stand on its looks, this case is another outstanding creation from Lian Li, offering a roomy interior, silent cooling, and exquisite craftsmanship.

At a whopping 25-inches tall, the PC-777 is frickin' mammoth. (Senior Editor Gordon Ung calls it "old-school huge.") Despite its all-aluminum construction, the case feels very sturdy and stout. You can glimpse your PC's innards through the case's mesh side doors, which greatly aid ventilation. A single thumbscrew holds each door in place, so you can get at your hardware in mere seconds. The required USB, FireWire, and audio ports are located on the top edge of the case's bezel.



Uncertain at first, we grew to appreciate the unusual snail-like design of Lian Li's Memorial Edition.

In a case this big, we'd expect plenty of room for all our hardware, and that's exactly what we got. A side-facing cage holds up to six hard drives. Each drive slides into its bay easily and is locked into place with small tabs. Above the hard drives are six 5.25-inch bays, suitable for optical drives. (The case even includes a black cover for the upper-most drive so your beige DVD burner won't sully your slick rig.) There's a silent 12cm intake fan in front of the hard drive bay, and another silent 12cm exhaust fan. While the cooling is adequate, an emphasis on quiet operation minimizes the amount of air moving inside the chassis. If you're going to use water-cooling in this case, you'll need to make provisions for more airflow.

All in all, the snail is one hell of an enclosure. It's Lian Li quality all around—stylish, functional, quiet, and well-made.

LIAN LI PC-777 MEMORIAL EDITION

+ ESCARGOT
Exotic, huge, and quiet.

– ESCAROLE
The fans are quiet, but they don't move much air.

9

MAXIMUM PC KICKASS

$250, www.silverpcs.com

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The StealthSurfer II promises to keep your Internet activities private, but savvy users can build a better mousetrap for a lot less money.

Stealth Surfer II Privacy Stick

Got something to hide?

Are you being watched? Between the Feds conducting warrant-less wiretaps and companies monitoring their employees' web-surfing habits, the notion of privacy is as quaint as a PS/2 port. The Stealth Surfer II can't help with your phone conversations, but it will cover your online tracks—at least most of them.

This password-protected USB device contains a suite of software designed to provide online privacy, but there's nothing about it that you couldn't duplicate using *any* USB memory key—and for a fraction of the price. The model we reviewed sells for $90 and offers a miniscule 128MB of flash memory (more than half of which is consumed by the applications). Higher-priced models feature the same software, but more memory (the 1GB model goes for a whopping $270—about $150 more than we'd expect).

Nearly all of the bundled products are free—either they're open-source software (Mozilla's *Firefox* web browser and *Thunderbird* email client), a free version of a paid tool (Siber Systems' *Roboform* password-management program), or a free level of service (Hushmail's encrypted email). And as surprised as we were to see the relatively ancient *Firefox 1.0.7* on the device (version 1.5 came out in November 2005), we were flat-out flabbergasted to discover that the bundled version of Anonymizer, Inc.'s IP-masking software *Anonymizer 2005* has been discontinued and is no longer supported by the developer.

So, what *do* you get for your money? A PDF users manual, Stealth Ideas' assurance that the software suite will play nice together, and tech support (provided you call between 8:00 a.m. and 5:00 p.m. Pacific Standard Time or submit your questions via email). We successfully contacted a tech-support person by phone during those hours, but we also discovered a real-world scenario in which the product spectacularly fails to deliver on its promise to keep users' online activities private: We launched *Firefox* from the Stealth Surfer II, surfed over to PartyPoker.com, downloaded the online game to the USB device, and watched as *PartyPoker's* install routine automatically launched *Internet Explorer* from the PC's hard drive and delivered us to its website. So much for stealth.

—MICHAEL BROWN

STEALTH SURFER II PRIVACY STICK

3

PRIVACY

Kind of enables untraceable web-surfing.

PIRACY

Outdated software; can't always deliver on its promise; expensive.

$90 (128MB), www.stealthsurfer.com

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Gaming

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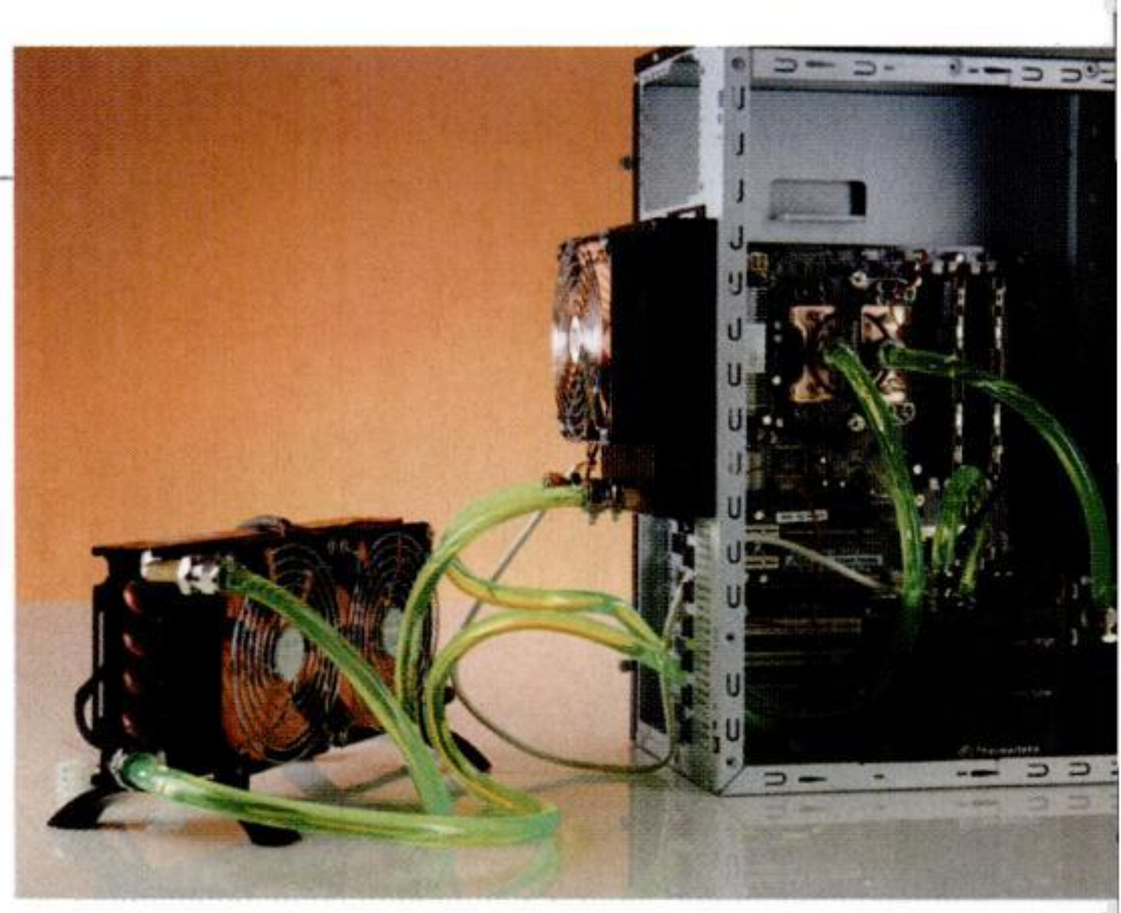
Liquid Lap Dance

Two revamped water-cooling kits return to the Lab

In May 2005 we reviewed the previous iterations of these two water-cooling kits. The Swiftech went home with a not-too-shabby 8 verdict, but the Thermaltake Bigwater scored a lowly verdict of 4. Now, exactly one year later, both kits have been upgraded and tweaked, hopefully to address some of our concerns. Are the tweaks just lipstick on a pig, or are they valuable improvements?

—JOSH NOREM



Thermaltake's Bigwater 745 is definitely "big," thanks to its dual radiators. Unfortunately, the tubing tends to unscrew the connectors, resulting in leaks.

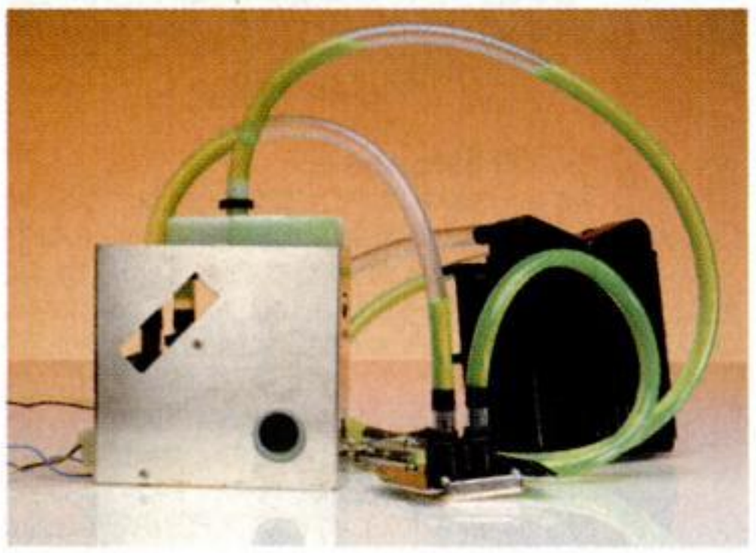
SWIFTECH H20-120 PREMIUM

We reviewed the new Premium version of the H20-120, which is Swiftech's standard high-performance water-cooling kit. Since we last reviewed the kit, Swiftech made several changes in order to simplify installation, improve performance, and promote silent operation. All in all, Swiftech has fixed almost every issue the previous kit had, with one exception—the instructions are still horrible.

The biggest change is the all-new Apogee water block, which blasts water onto the area above the CPU core, causing a lot of turbulence and enhancing heat exchange. The pump, which uses 3/8-inch internal-diameter tubing, is now integrated directly into the reservoir to reduce the amount of tubing inside your case. Swiftech includes smart coils, which wrap around the tubes to help prevent kinks in the lines, but we didn't need them in our test case. Props to Swiftech for finally making the fan speed adjustable. You can run it at 12V, 7V, or 5V, using different power connectors.

Installation is rather straightforward, but the instructions are as user-*un*friendly as any we've ever seen. All the info is there, but it's so dense that the average consumer will likely be put off.

Once installed, however, Swiftech's kit runs quiet and performs exceptionally. We didn't experience any leaks or hassles, and the temperatures were on par with the best kits we've tested. Using the 12V connector, our load temp was 40 C. Using the silent 5V fan speed, the temps rose only 3 C. And with its single 12cm radiator, the H20-120 offered the exact same performance as the Thermaltake's Bigwater 745, which has *three* 12cm radiators.



The H20-120 Premium lets you run the radiator fan at 5V, 7V, or 12V for maximum performance at the expense of silence.

SWIFTECH H20-120 PREMIUM

SWIFT TECH'D
Awesome performance, quiet, and expandable.

SWIFT BOAT'D
Installation instructions are way too dense.

9

MAXIMUM PC KICKASS

$200, www.swiftnets.com

THERMALTAKE BIGWATER 745

The previous version of Thermaltake's Bigwater received a smackdown from us last year, and though this new kit is significantly improved, it still suffers a fatal flaw.

The biggest change to the kit is the addition of a second radiator. That's right, the kit sports two radiators—one large, one small. You'll bolt the small one to the rear of your case, and set up the second double-wide radiator on four little feet outside your case. It's an awkward design, and it would make more sense to mount it on top of your case. The Bigwater also lacks the quick-detach plugs we've grown to love on external radiators, so moving your PC with the large radiator in tow is a major hassle.

The kit uses a brand-new silent pump that's extremely easy to attach and fill. It sports 3/8-inch tubing, which is much fatter than the 1/4-inch tubes used in the previous version. The upgraded copper water block features more water channels, and all tubes attach using compression fittings that screw onto the radiator.

The radiator barbs are poorly designed, as they're screwed onto the radiator inlet/outlet ports instead of being permanently affixed. When you move the radiators or your PC, the tubing twists and unscrews the connectors from their sockets, resulting in leaks. The kit leaked throughout testing, and even leaked as we were setting it up for photography. This issue can be resolved by tightening the nuts with a crescent wrench, but you shouldn't have to do this to a kit right out of the box.

Installation has gotten much easier, but motherboard removal is still required for all sockets, which is unfortunate. Once you install the included backplate, it's simply a matter of securing the water block via thumbscrews.

We love the decadence of the Bigwater, but water leakage is a deal-breaker. With solidly mounted (versus screw-in) fittings, it could be a real contender.

THERMALTAKE BIGWATER 745

RADIATOR
Super cool, very blingy, and easy to install.

GLADIATOR
Mobo removal required, a second radiator is awkward, and the bloody thing leaks!

2

$170, www.thermaltake.com

BENCHMARKS

	THERMALTAKE	SWIFTECH	STOCK
IDLE (C)	**30**	**30**	40
100% LOAD (C)	**39**	40	54

Best scores are bolded. All temperatures were measured via the onboard sensors, using the utilities provided by the motherboard manufacturer. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved running CPU Burn-in for one hour.

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This kit is perfect for:

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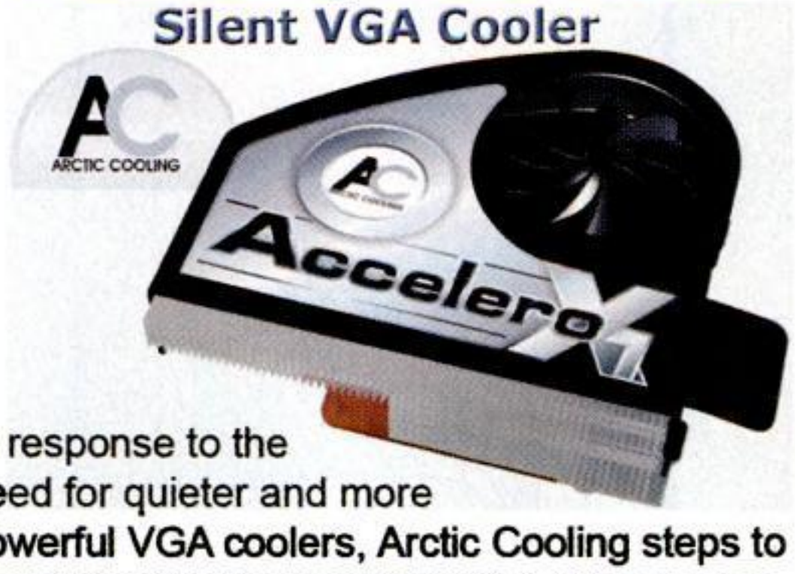
- Silent computing users looking for the lowest operation noise.

SVC **Sale Price: $259.95**

Arctic Cooling Accelero X1&2 Silent VGA Cooler



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CM Stacker 830 sets the standard with its stylish streamlined aluminum design, extremely powerful functionality and its brilliant ATX/BTX dual-compatibility mechanism. The stacker 830 was awarded Gear of the Year award by Maximum PC!

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If you want to capture a planet in *Empire at War,* you first need to destroy the orbital defenses before you can make your ground assault.

Star Wars: Empire at War

The Force is with this shallow-but-satisfying strategy game

Star Wars strategy games haven't fared well. *Force Commander*—one of the earliest 3D-rendered RTS games—frequently appears in "Worst Games of All Time" lists. *Galactic Civilizations* was a touch better, but ultimately nothing more than a total conversion for *Age of Empires. Empire at War,* however, bucks the trend by delivering a fun, if shallow, Star Wars strategy experience.

There are three components to *EaW*: a strategic galaxy conquest game, a tactical space combat game, and a tactical land combat game. None of the three components features particularly deep gameplay—most of the combat boils down to a rock/paper/scissors-style choice between the different weapons at your disposal, but switching back and forth between the different types of gameplay makes for an enjoyable experience.

The strategic game is like *Masters of Orion*-lite. You'll need to use your credits wisely, choosing the right planets to improve and planning defenses for planets that will face attacks, all while building a fleet (or three) and a ground-based army. We really enjoyed this portion of the game—the decisions you make in the galactic view really affect the tactical portions of the game.

Whether you're fighting in space or on land, the basic combat is the same. Your units are particularly strong against a few types of units, and particularly weak against others. Your ability to effectively match your units—whether they're Y-Wing fighters, AT-AT Walkers, or the Death Star—against the weaknesses of your opponents will make the difference between success and failure.

The tactical gameplay is (unsurprisingly) much more compelling in the space battles than the land combat. Part of the problem is that the vast majority of the land units (both Rebellion and Imperial) couldn't be pulled from the movies, and Petroglyph filled those gaps with cookie-cutter RTS units established 10 years ago—tanks, infantry, artillery. The space combat feels more fleshed out, with more roles for different ships to fill.

While it's definitely not a must-have game, *Empire at War* is a pleasant enough way to fritter away a rainy or snowy Sunday.

—WILL SMITH

STAR WARS: EMPIRE AT WAR

8

+ BOBA FETT
Entertaining space combat with a Star Wars theme.
Boss Han Solo around!

– JANGO FETT
Ground battles can be tedious.
Basic rock/paper/scissors gameplay.
Unimaginative unit types

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MORE GAMES

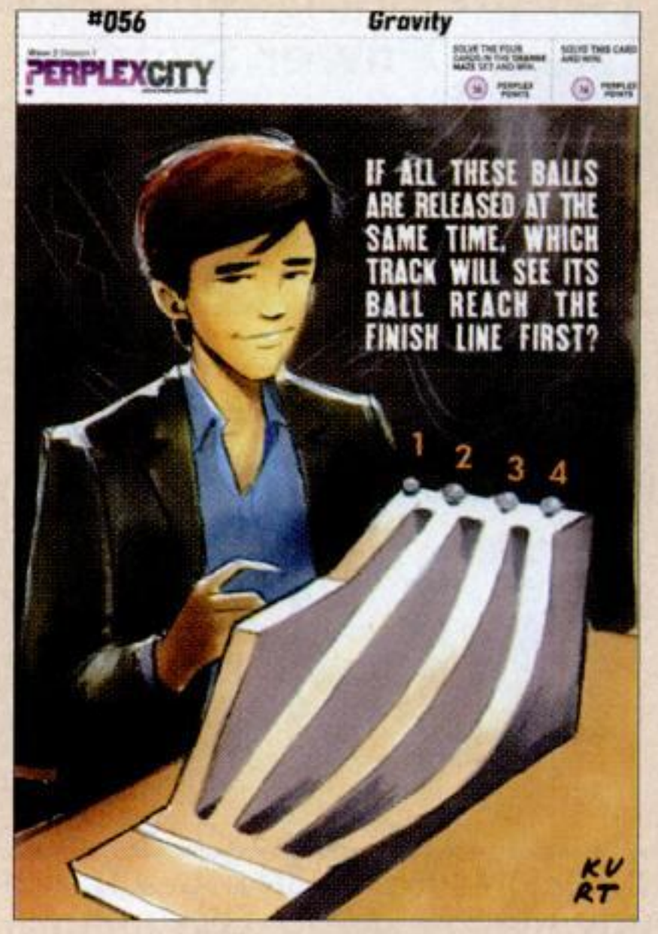
Perplexcity

Do you like brainteasers? Well, we love 'em, whether they involve words, logic, math, or images. And we've never found as rich a source of brain food as the UK-based alternate-reality game (ARG) *PerplexCity.* ARGs are games that blur the line between the game world and the real world by hiding clues for you to find, both on the Internet and in meatspace.

There are two components to *PerplexCity*: 256 different puzzle cards as well as the real-world search for the lost Receda Cube, which is hidden in, well, the real world. Cryptic messages in the puzzle cards and on the Internet point to the Cube's secret location, and the first person to find the cube wins $200,000! The puzzles' difficulty range from very easy (basic illusions and trivia) to insanely difficult (cryptographic challenges that could require the combined efforts of hundreds of people). When you solve a puzzle, you enter the answer at **www.perplexcity.com**. As you correctly solve the puzzles, your account is credited with points, so you can compare your progress in the game with the online leader boards.

The ARG portion of the game is interesting, but we especially love the challenge of the puzzle cards. Try one yourself: If you think you have a solution for the card below, go to **www.perplexcity.com/keyword/maxpc** and find out.

—WS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Gravity
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IF ALL THESE BALLS ARE RELEASED AT THE SAME TIME, WHICH TRACK WILL SEE ITS BALL REACH THE FINISH LINE FIRST?
1 2 3 4
KV RT

PERPLEXCITY

9

$5 for a pack of 6 cards, www.perplexcity.com

MAXIMUM PC KICKASS

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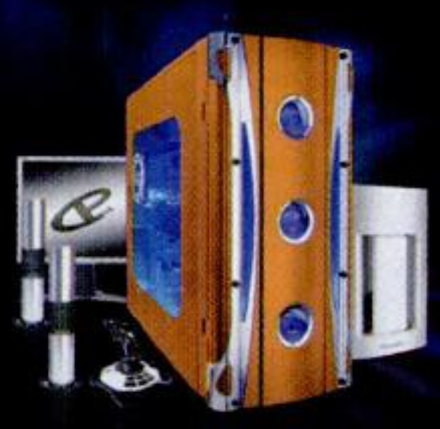

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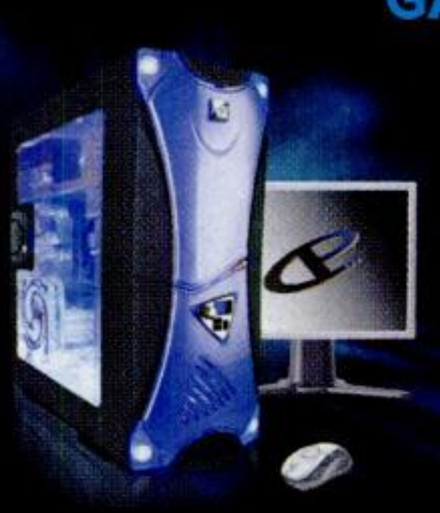

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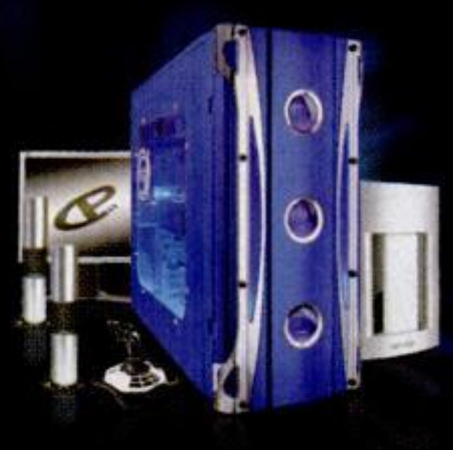

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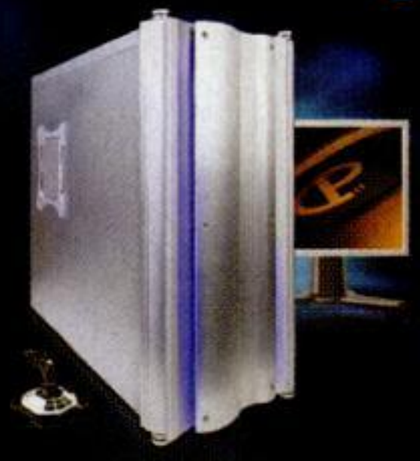

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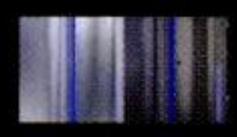

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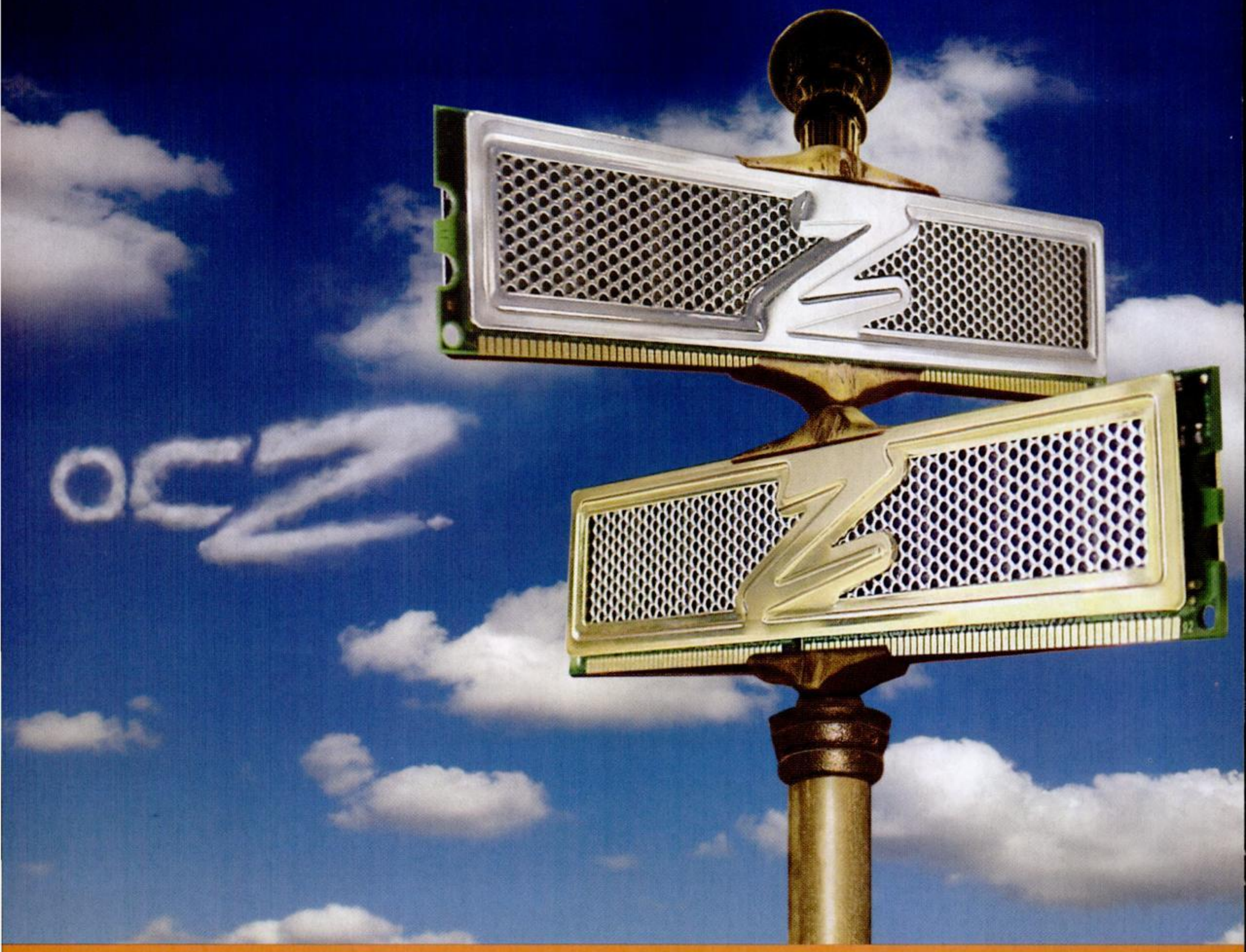

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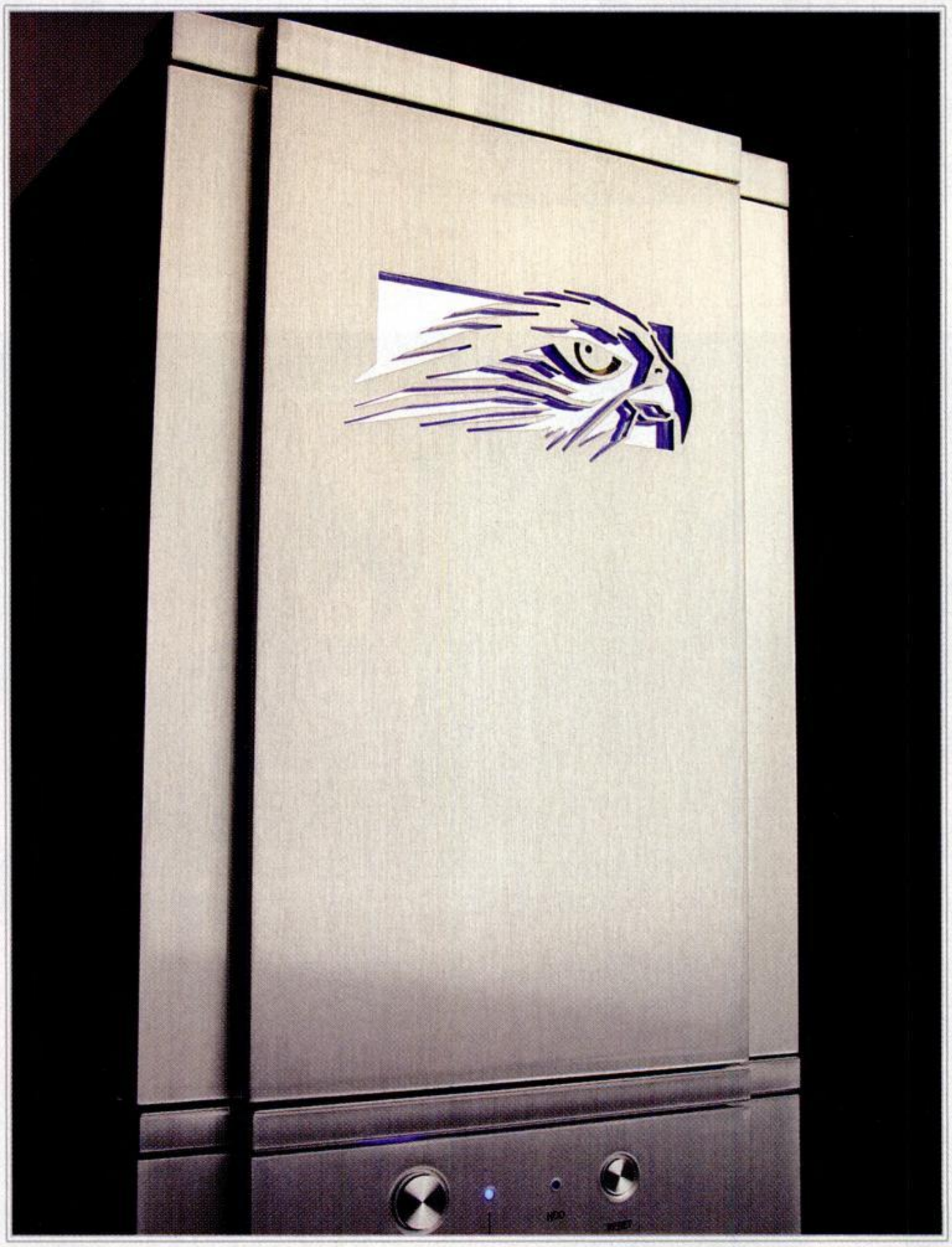

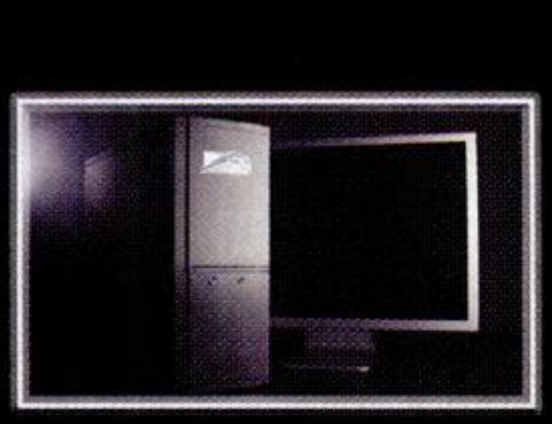

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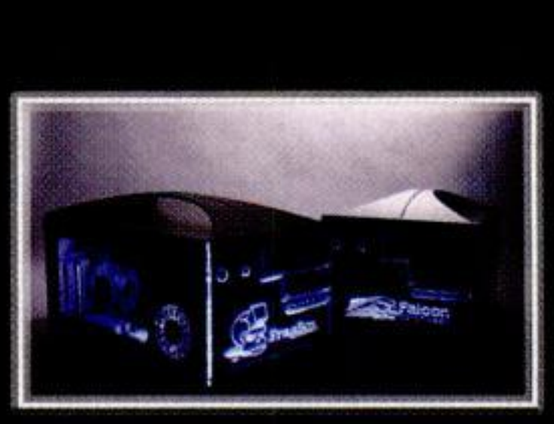

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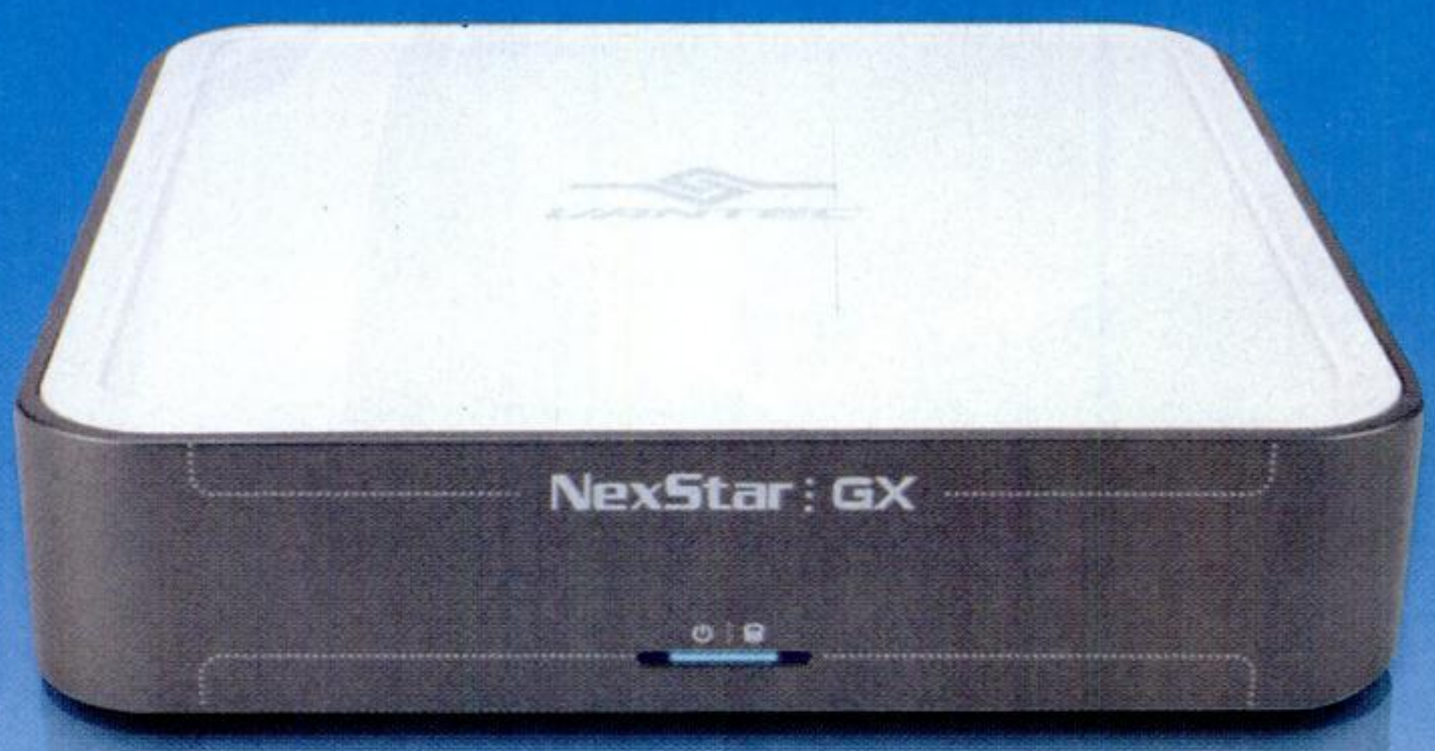

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Digital Video Cables

HDMI - High-Definition Multimedia Interface - is quickly becoming the most common interconnect for HDTV. NXG Series HDMI cables deliver ultra high-bandwidth digital video and audio signals from any HDMI source to any HDMI display. And, both are 100% HDCP compliant which means they will pass-along the High Definition Copy Protocol to your monitor. This "handshake" allows you to view copyrighted HD content on your Plasma or LCD display without interference.

DVI - Digital Visual Interface was developed & designed to maximize the digital video display of projectors & LCD screens. DVI connections are common in many high-resolution home theater and computer monitors as well as a number of other components available today. DVI-D refers to a specific configuration of the pins on the cable to transmit digital signals only.

NXG Digital Video cables are available in the affordable Custom Series or high-end Professional Sapphire Series.

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NX40510	10 meter	$199.95
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Component Video Cables

Component (YUV) Video cables are used primarily for DVD Players and high-definition devices that have not adopted the new digital video interconnects. NXG Sapphire Series Component Cables:

NX6002	2 meter	$29.95
NX6004	4 meter	$39.95
NX6010	10 meter	$59.95
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Digital Audio Cables: Optical (Toslink) & Coax

Digital Optical (Toslink) and Digital Coax cables are used for digital audio connections with stereo and surround sound and are common on DVD Players, high-end CD Players & Media Center PCs. Toslink fiber-optic cables are especially sensitive so a high-quality connection is essential for reliable performance.

NX7002	Sapphire Series 2 meter Optical Toslink	$34.95
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SO WHAT'S STOPPING YOU?

TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to **rig@maximumpc.com.** Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) October 15, 2006, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. The final winner in this contest will be announced in the January 2007 issue. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod's likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.

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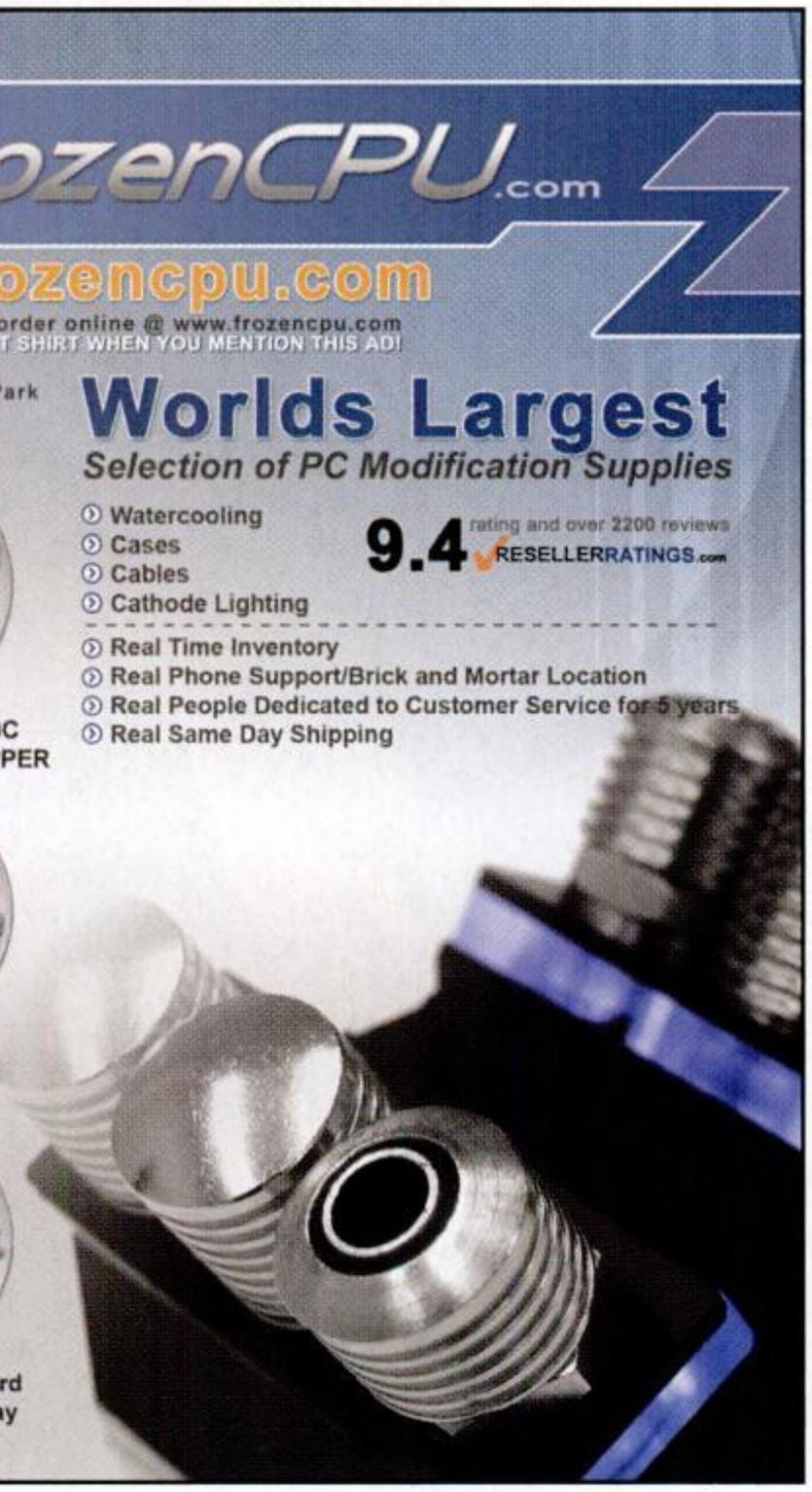

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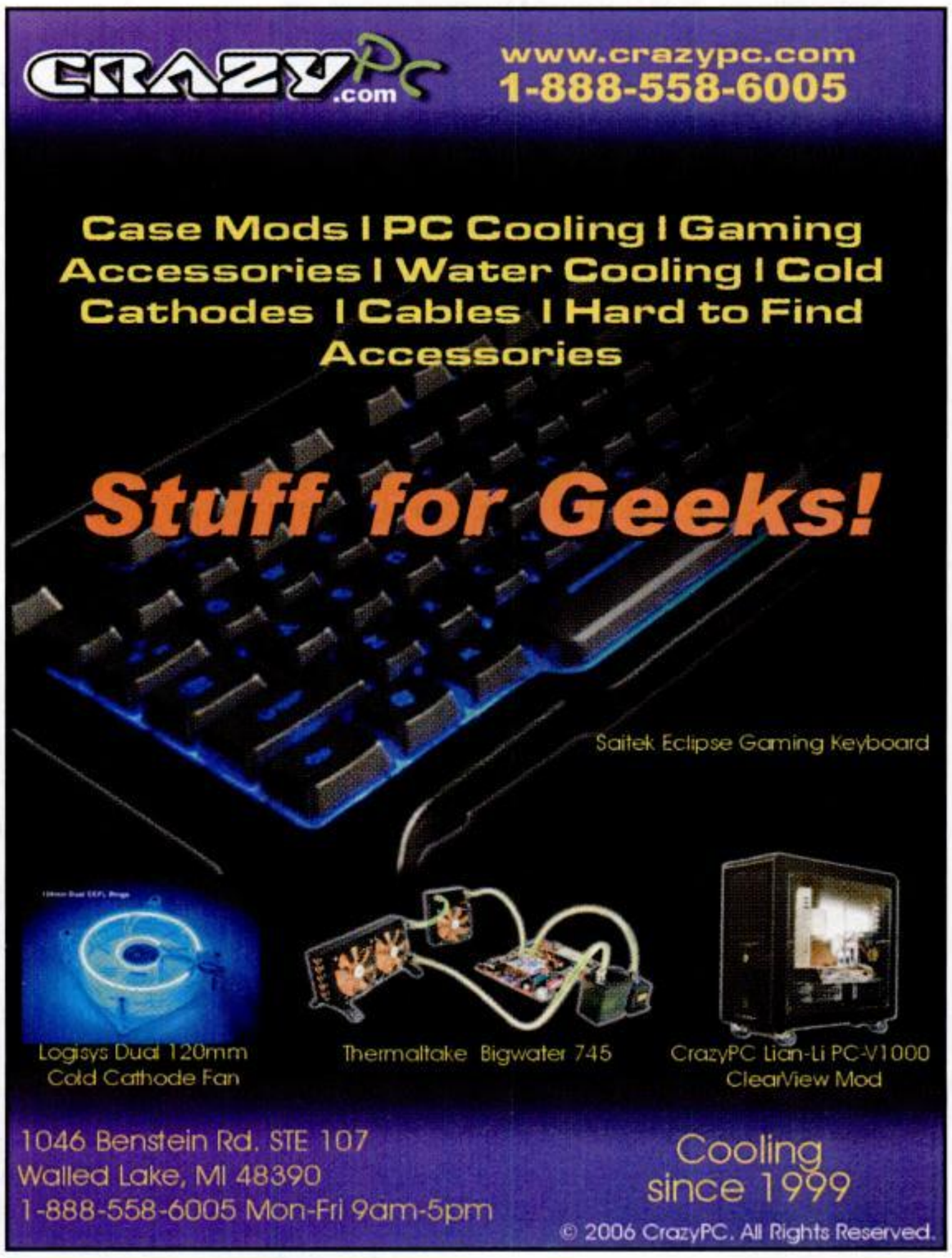

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We tackle tough reader questions on...

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BUYING THE DIY LAPTOP

I was very interested in your article on building a laptop [April 2006], but when I tried to buy the parts you used, in particular the AOpen 1559, I couldn't find a retailer. The two sources you mentioned in the article are dealer-only organizations, from what I could tell from the web, and they don't seem interested in providing a "bare-bones" laptop to a common PC building enthusiast.

Where can I get a laptop chassis?

—Paul D. Gittins

EDITOR IN CHIEF WILL SMITH RESPONDS: Unfortunately, as we went to press with the April issue, the vendors we listed in the article said they would offer the AOpen 1559 for sale to end-users. Between the time we printed the issue and it got to readers, those vendors seem to have changed their tune, and aren't actually selling the notebooks to consumers. There is another option, though; you can purchase the laptop chassis online at http://store.myaopen.com.

HAS INTEL GIVEN UP ON GAMERS?

It appears that Intel has abandoned the gaming PC (leaving that market to AMD), for a modern-day multimedia and do-everything mobile strategy.

I just thought you should consider this when you review its new CPU. It's more than obvious that Intel has realized that it can't compete head-to-head with AMD on pure power—so it's going for the next wave.

After all, who really cares if your gaming system can exceed 200fps in the latest games?

—Kim Miller

SENIOR EDITOR GORDON MAH UNG RESPONDS: I think you underestimate Intel's Core microarchitecture CPUs, and Intel's resolve to recapture the gamer market. While we haven't personally tested Intel's new Conroe processor, the company publicly demoed its new baby, which spanked AMD processors in a bunch of different apps, including games. From where we sit, the Core microarchitecture looks to be suited for all the things you mentioned: gaming, multimedia, and mobile. It's pretty apparent that Intel isn't about to give up on the gaming enthusiast; it was just waiting to push the Pentium 4 all the way through its system before it could move on.

GIVING DUAL-CHANNEL ITS DUE

Pardon me, but doesn't the Dell E1705 [reviewed in April 2005] mark the advent of dual-channel RAM in laptops? Running RAM at 667MHz in dual-channel mode would seem to be a contributing factor in the E1705's performance. Shouldn't dual-channel memory's first appearance in a laptop get it a notable mention and a moment in the spotlight?

—Al Partin

SENIOR EDITOR GORDON MAH UNG RESPONDS: Actually, dual-channel RAM has been used in x86 notebooks since as far back as the early Pentium 4 desktop-replacement models, such as the HP ZD7000 we reviewed in 2003. Furthermore, many of the Dothan-based Pentium M processors shipped in dual-channel configurations.

LOOKING FOR A LINUX PVR

*I am looking into getting a freeware program that will allow me to record TV shows on my computer, much like a Tivo. So far, I know of **Freevo** and **MythTV.** But it seems like both of these would be difficult to install if you know nothing about Linux.*

Are there any other less complicated freeware options out there?

—Adam Stevens

EDITOR IN CHIEF WILL SMITH RESPONDS: What you're looking for is a Linux LiveCD that comes preinstalled with *MythTV.* While *KnoppMyth* is just that, we wouldn't consider it particularly accessible to a Linux neophyte. Unfortunately, it supports just a few types of TV tuners and is still very rough. If you're interested in learning more about Linux, I highly recommend Ubuntu. It's a Debian-based

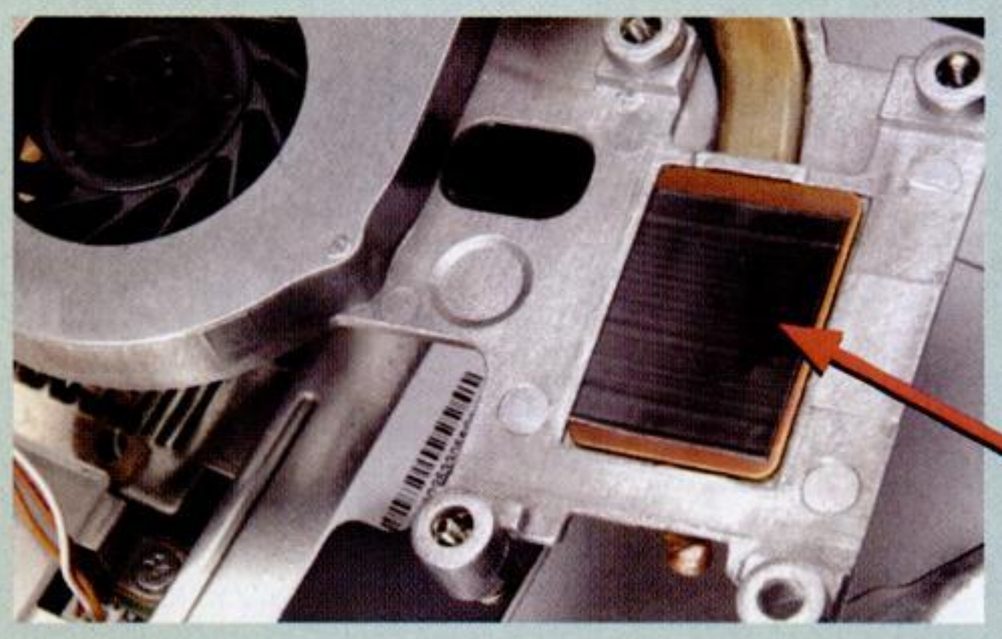
CUTCOPYPASTE

- We incorrectly identified the writer of the "Juicy Juice" question in the February 2006 Ask the Doctor column. The writer was John Carrigan.
- In our March and April issues, we said the proper pronunciation of Intel's Viiv technology was *Veev,* but it actually rhymes with "five."

But Laptops Need Thermal Paste Too!

In your article about building your own laptop [April 2005], you do not mention the use of Arctic Silver in the step for installing the CPU heat pipe or the graphics module. Is this an oversight?

—Eric von Guggenberg



SENIOR EDITOR GORDON MAH UNG RESPONDS: We did not use Arctic Silver on either the processor core or the MXM module because the thermal pads on both the CPU and GPU were unmolested. Because our tests have shown very little difference between the default thermal pads and premium thermal greases, such as Arctic Silver, there's no real reason to scrape off a cooler's included thermal pad.

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LiveCD distro, and is designed to be easy for Linux newbs to get started. Even better, when you're ready to install *MythTV,* there are already precompiled applications for the OS.

FINDING THE PERFECT REPLAY

Your April article "Copy Your Movies and Music" was so welcome. I am tired of losing the ability to play songs after changing computers or hard drives, just because I can't keep up with all the licenses.

In your April cover story, you said that an app called ***Replay Music*** *could help me capture the audio from protected files. Unfortunately, I looked at the products on Applian's site and couldn't figure out which app I need, so I downloaded a couple of trials, but I couldn't get them to work.*

How do I re-record all the songs on my hard drives that have DRM? What product do I use?

—John Galligan

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: I think Applian Technology might have redesigned its website since our story came out, and unintentionally made the program you're looking for—*Replay Music*—difficult to find. Looking at www.applian.com today, *Replay Music* is listed under the heading "Download Music." Click the Go button in that box and you'll be taken to a page where you can either purchase the program or download a free demo. I'd encourage you to try out the demo before committing to a purchase, just to make sure it fits your needs. The demo will limit you to recording a maximum of 25 songs, but that should be enough to help you make a decision.

LEARNING TO RIP PROTECTED WMA TRACKS

I just ripped open the April issue and saw "How to Convert Any Media" on the cover and thought that finally I'd get step-by-step instructions on how to convert protected WMA files. But, nope. Nothing there. Clearly you didn't cover everything, and I would think WMA would be a pretty important one. How about a little deeper coverage, especially since it's on your cover?!!!

—Bill Richards

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: We're one step ahead of you, Bill. We included a fool-proof procedure to let you convert any audio file—WMA, AAC, protected or not—to an unencrypted MP3 on page 33 of the April issue. The *Replay Music* (www.applian.com) app converts protected WMA files or AAC files to unprotected MP3 or WAV files. It will even rip streaming audio from the Internet. The only downside is that it's a real-time process (although you can queue up batches of tracks at a time). You'll need to purchase the software we mention if you want to convert more than 25 tracks. You'll also need to have legitimate licenses for the music you wish to convert in the first place, but this process will free your subscription tunes from their DRM shackles so you can play them on devices such as the iPod.

LINUX + ENCRYPTED CD = MP3!

I want to add one more way to copy some CDs that have copy protection. My daughter wanted to put a CD on her MP3 player and I couldn't get it to play, even though it said it was supposed to be able to. I noticed it was a Sony CD, and remembering that Sony's protection only works in Windows, I booted into Ubuntu Linux, ripped the music to MP3s, and copied them into a network share I can access in Windows. I then went into Windows, transferred the MP3s to a hard drive, and then to an MP3 player, and the songs played fine.

—Rick Garman

PINNACLE STUDIO WORKS—KIND OF

I would like to add some comments to your review of ***Pinnacle Studio 10*** *in the April issue. Several years ago, I bought* ***Studio 8.*** *It seemed full of bugs. I later went to* ***Studio 9,*** *same problem. After spending a lot of time reading about users' experiences with* ***Studio,*** *I discovered the secret of success.*

Here's what I did to get the program working properly: I reformatted my hard drive, installed XP SP2, disabled System Restore, turned off the screensaver and anti-virus, and defragged my hard drive. Only then did I install ***Studio 9*** *and its patches. It installed flawlessly in just a few minutes.*

Result: ***Studio*** *has operated flawlessly for the last year. I use it to make slide shows of my digital pictures, and to convert VHS tapes to DVD. While I'm aware that my experience is with* ***Studio 9,*** *and your review is about* ***Studio 10,*** *but I have a feeling the same principles of installation apply.*

—Harold Wood

SENIOR EDITOR GORDON MAH UNG RESPONDS: Thanks for the tip, Harold. I think the problem with *Studio 10* was that I didn't check the "Reformat your hard drive?" option before installing it. While it's good that you managed to get the product working for you, we'd still recommend that people considering *Studio 10* buy something better. MPC

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COMING NEXT MONTH

IN THE "NOW WITH SIX BLADES" JUNE ISSUE OF MAXIMUMPC

IS YOUR PC READY FOR VISTA?

Does your PC have the chops to run this fancy-pants OS, with all its bells and whistles? Find out next month as we run Vista on every system config we can get our hands on!

A POWER USER'S GUIDE TO DUAL-CORE!

If you just bought a dual-core CPU, or are considering it, this guide is written just for you (no offense, single-core folks). We'll show you how to take advantage of your new proc's power and more, in this must-read guide!

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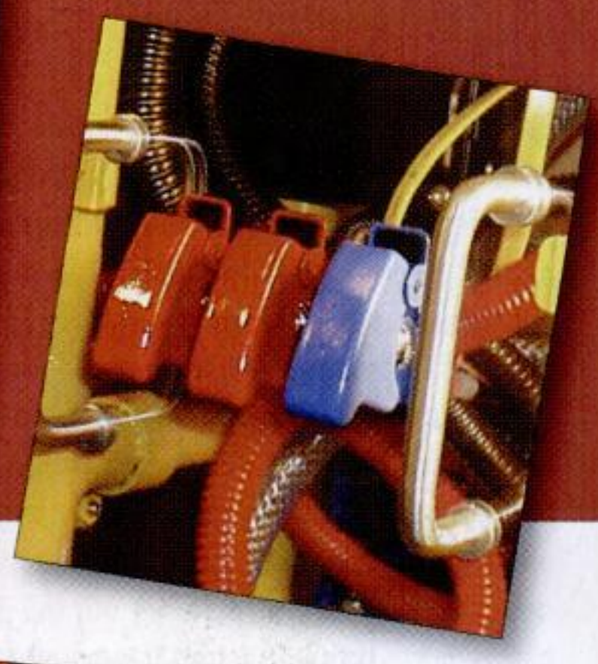
MATT DICK'S

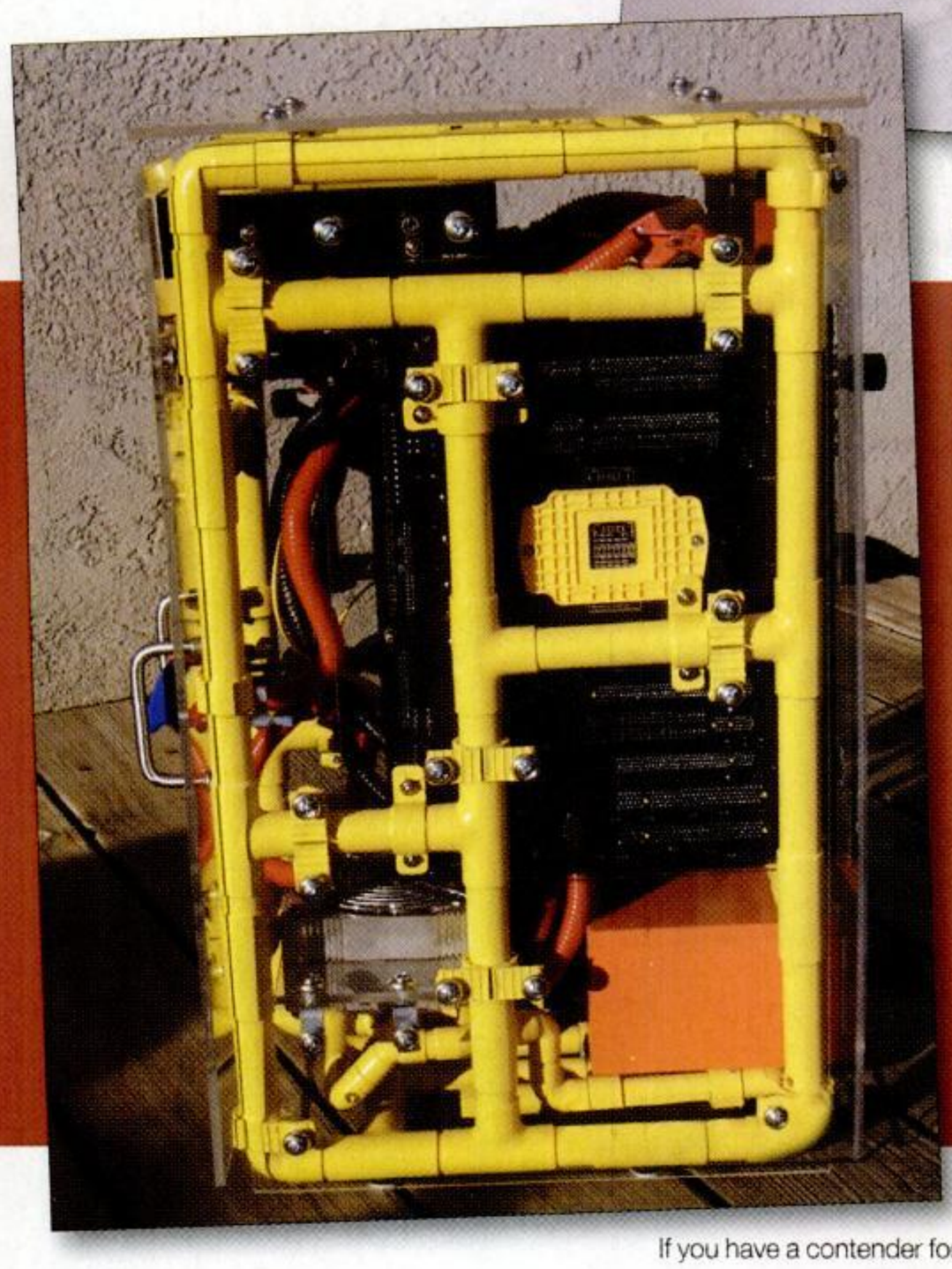
Framiator

To some people, installing a prefab water-cooling kit seems like a daunting project. Well, just imagine building an entire computer frame out of copper plumbing pipe and sending water through every inch of it (totaling 20-some feet), to cool all your various PC parts. Such was the challenge for Matt Dick, whose rig is named after that yellow-painted pipe's role as both frame and radiator. Here's how it works: Plastic tubing connected to the copper frame via hose barb (near the PSU) sends cooled water to a chipset water block, then a CPU water block, and then the blue Danger Den pump on the case's left side. From there the H_20 travels back into the copper frame, where it's cooled once again as it completes the cycle.

Lessons learned: "Accessing the interior is difficult," says Dick. "I should have reversed the screws and used wing nuts on the outside."

Toggle switches on the front of the case control power, reset, and interior UV lights.





The Framiator houses an Athlon 64 3200+ CPU. Using tips he picked up from *Maximum PC's* March "Overclock" issue, Dick pushed the proc's front-side bus from 200MHz to 238MHz. Temps never rose above 33 C running *SiSoft Sandra's* burn-in wizard continuously.

For his winning entry, Matt Dick wins a $500 gift certificate for TigerDirect to fund his modding madness! See all the hardware deals at www.tigerdirect.com, and turn to page 92 for contest rules.

If you have a contender for Rig of the Month, e-mail **rig@maximumpc.com** with high-res digital pics and a 300-word write-up.

MAXIMUM PC (ISSN 1522-4279) is published monthly by Future US, Inc, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080, USA. Periodicals postage paid in South San Francisco, CA, and at additional mailing offices. Newsstand distribution is handled by Curtis Circulation Company. Basic subscription rates: one year (13 issues) US: $20; Canada: $26; Foreign: $42. Basic subscription rates "Deluxe" version (w/CD): one year (13 issues/13 CD-ROMs) U.S.: $30; Canada: $40; Foreign $56. US funds only. Canadian price includes postage and GST (GST#R128220688). Postmaster: Send changes of address to Maximum PC, P.O. Box 5159, Harlan, IA 51593-0659. Standard Mail enclosed in the following edition: None. Ride-Along enclosed in the following editions: B, C, C1, C2, C3. Int'l Pub Mail# 0781029. Canada Post Publications Mail Agreement #40043631. Returns: 4960-2 Walker Road, Windsor ON N9A 6J3. For customer service, write Maximum PC, P.O. Box 5159, Harlan, IA 51593-0659; Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Future Network USA also publishes PC Gamer, PSM, MacAddict, Official Xbox, and Scrapbook Answers. Entire contents copyright 2006, Future Network USA. All rights reserved. Reproduction in whole or in part is prohibited. Future Network USA is not affiliated with the companies or products covered in Maximum PC. PRODUCED AND PRINTED IN THE UNITED STATES OF AMERICA.

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